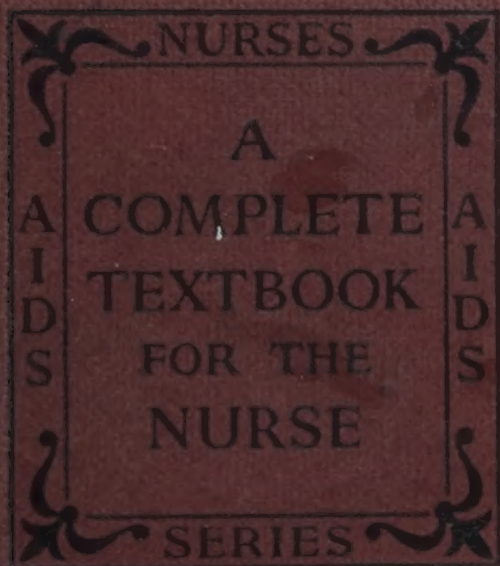


AIDS TO
MATERIA MEDICA
FOR NURSES



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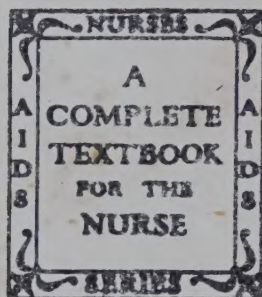
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Aids to meteria

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AIDS TO
MATERIA MEDICA FOR NURSES



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AIDS TO MATERIA MEDICA

for Nurses

BY

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WITH FOREWORD BY

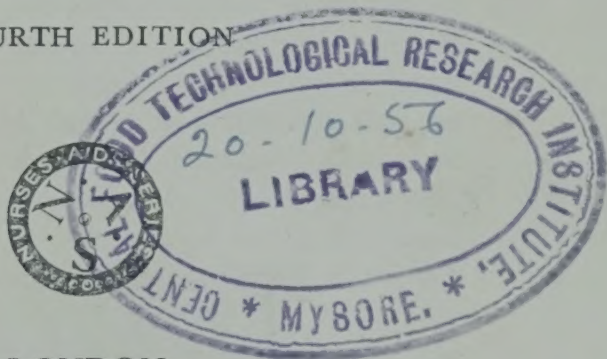
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FOREWORD TO THE NURSES' AIDS SERIES

THE Nurses' Aids Series is designed to provide a series of textbooks in the various fields of knowledge required by the modern nurse. It covers the subjects included in the syllabus of the General parts of the Register, and, in addition, includes volumes on certain specialized subjects such as fevers, tropical nursing, the setting of trays and trolleys, and theatre technique. New volumes are added to the Series from time to time.

Each volume is a complete textbook on its subject (the title "Aids to" indicates that the books are aids to knowledge and not aids to the study of larger books) and is written, except in a few instances, by a Sister Tutor at a prominent hospital. The whole Series aims at providing concisely, clearly and simply just that quantity of information which the nurse needs to possess, gathered together in well illustrated, easily read and easily carried volumes at a price within the means of any nurse. Judged by the welcome it has received, this aim has been accomplished, and the student nurse has at her disposal a set of convenient, up-to-date, comprehensive textbooks.

The General Editors would like to take this opportunity of thanking all those who have been so helpful in their criticism and support of the Series.

(Signed) KATHERINE F. ARMSTRONG, S.R.N.,
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LONDON.

FOREWORD

SINCE the last edition of this book many new drugs have come into general use. It is difficult for the nurse to keep pace with the rapid advances in therapy and it is important that she should have available a comprehensive yet brief account of the materia medica used in the treatment of the sick. It is essential that she should appreciate the dangerous toxic effects which may be produced by present day drugs as well as having a general understanding of their action in the body and of the diseases for which they are used. This book gives an admirable and up-to-date account of the drugs used in present day treatment and it will be valuable both as a reference book for senior nurses and as a study book during training. Great care has been taken to exclude inessentials and to make the descriptions of drugs and their uses simple and lucid.

It is a great privilege to have the opportunity of addressing this foreword to the readers of this book. Present day nursing has to be adjusted to the demands of modern medical methods which are complex, exacting and rapidly advancing. I have no doubt that the nursing profession is equal to these demands and that it will maintain its traditional skill in the treatment of patients. This book will help the individual nurse to live up to this high standard.

I. MACPHERSON.

LEEDS,

January, 1953.

PREFACE TO THE FOURTH EDITION

OWING to the frequent discovery and rapid development of new drugs it is becoming increasingly difficult to write a book such as this and it is almost an impossibility to make it up to date and comprehensive, and yet at the same time to keep it simple and within the limits and scope of what we expect a nurse to know.

I have been greatly helped in my task by the Staff at Leeds Infirmary. The Sisters in the Special Departments have given me guidance. Mr. Blacow, the Senior Pharmacist, has been most helpful in making suggestions and criticisms, and I am very greatly indebted to Dr. Macpherson, for his continued interest and help. Finally I very much appreciate the help which I have received from Miss Armstrong, who has been most painstaking in her criticisms and without whose help I feel I would never have achieved this new edition.

In conclusion I would like to thank Messrs. Baillière, Tindall and Cox for their patience and courtesy.

A. E. A. SQUIBBS.

THE GENERAL INFIRMARY,
LEEDS,

January, 1953

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INTRODUCTION

BEFORE making a study of any special subject it is interesting to know something of its history. Drug lore is no modern science. Since man was created, herbs have been used for medicinal purposes, and a study of plant life from the earliest times has led to our present knowledge of drugs.

The value of a number of herbs has been recorded in the ancient writings of the Assyrians, and we find that drugs used in these days, such as opium, Indian hemp, gum acacia, and others, were mentioned in the Papyrus Ebers of the Ancient Egyptians. The first recorded use of mustard and squill was made by Pythagoras in the temples of Ancient Greece.

Hippocrates and his followers were well acquainted with all manners of vegetable drugs, and many of these have been mentioned in his writings. Alexander the Great, as the result of his expeditions to Persia and India, contributed a more extensive knowledge of drugs than had existed formerly. Drugs were among the treasures which he brought back to Greece. From the Ancient Roman Empire we obtain a vast classification of drugs. In the writings of Celsus alone some 500 drugs have been enumerated, and Discorides compiled a classified description of no fewer than 200 medicinal plants. He described their uses, and his work was accompanied by illustrations. He was the first man to separate the knowledge of crude drugs from medicine.

After the decline of the Roman Empire, seats of learning were established in Arabia. The chief contributions of the Arabians was made by Avicenna, whose "Canon of Medicine" was the chief source of medical knowledge until the fifteenth century. He added many drugs to the *Materia Medica* which had been compiled by Galen and Discorides. His work

was later condemned in the sixteenth century by Paracelsus.

The spread of the Benedictine monks from Italy to the Northern Alps was instrumental in the spread of knowledge and cultivation of medicinal plants. Outstanding amongst the people of this period was Hildegarde, Abbess of the Convent of Disibodenberg. She compiled a work of natural history, "Physica," in which she described a number of plants. So with the decline of one empire and the rising into power of another, and as one century succeeds another, there is an unbroken record of writers who have made a special study of drugs.

The sixteenth century, in common with other revivals, saw a revival in the study and use of drugs. From this time onwards other substances as well as plants were used for medicinal purposes, as we learn from that scene in "Macbeth" when the witches made up their "potions":

" Fillet of a fenny snake
In the cauldron boil and bake,
Eye of newt and toe of frog,
Wool of bat and tongue of dog."

In the seventeenth century attention was paid to the chemical constitution of vegetable drugs, and the localisation of glucosides and alkaloids resulted.

Let us now consider the sources from which drugs are obtained. Many drugs are obtained from the vegetable, animal and mineral kingdoms, and some are made synthetically.

The Vegetable Kingdom.

It is interesting to note that every part of plant life is made use of as a source of one drug or another.

Leaves.—The leaves of plants are the source of such drugs as digitalis, senna, jaborandi, stramonium, belladonna, and others. They are collected and dried before they are prepared for use.

Flowers.—In other instances the flowers of plants may be the source from which drugs are derived. In most cases we find that drugs obtained thus are chiefly used as colouring and flavouring agents. Examples of these are the petals of the red poppy, used as a colouring agent, and rose water, which is obtained from the red or Provins rose grown chiefly in Southern Europe. One of the exceptional cases in which the flower is used for its medicinal value is that of the flower of wormseed, or santonica, from which is derived the drug santonin, the oldest anthelmintic in existence.

Fruits.—The fruits of plants yield a certain number of drugs—for example, senna pods, which are obtained from the dried ripe fruits of the Indian and Alexandrian senna plant. The juices, and the oil obtained from the peel of the lemon and the orange are used, on account of their bitter and aromatic properties, as tonics and flavouring agents. Other fruits used as flavouring agents are cardamom, vanilla, and pepper. The bitter apple is a source of colocynth and grows in proliferation in the deserts of Africa and Egypt. This again is a plant which has been used since the very early days. The oil of the fruit of anise is employed as an aromatic and carminative, and the volatile oil of the juniper berries is both diuretic and stomachic.

Seeds.—Some very important and much-used drugs are obtained from seeds. The chief of these are linseed, calabar bean, strophanthus, and nux vomica. Linseed is used both whole and crushed, the former for making mucilage and the latter for linseed poultices. Calabar beans are the ripe seeds of the *Physostigma venosum*, a woody plant growing on the West Coast of Africa; it is the source of the alkaloid physostigmine. Strophanthus seeds are obtained from a climbing plant growing in Africa which is used

by the natives for arrow poison. In the nineteenth century *strophanthus* was introduced into England and used as a substitute for foxglove leaves. *Nuxvomica* seeds contain three constituents, the most important of which is strychnine. Sometimes the entire plant is used, and examples of drugs obtained thus are aconite, which is obtained from monk's-hood; lobelia, which is an Indian tobacco, and has much the same action as nicotine; and agar-agar, which is the product of various algæ obtained chiefly in Japan.

Bark.—The main substances obtained from bark are cascara and cinchona. The supply of cinchona is obtained nearly entirely from Java and India.

Finally, other drugs are obtained from the roots and bulbs of plant life. Examples of these may be found in senega, liquorice, ipecacuanha, gentian, jalap and belladonna. All liquid extracts of belladonna are prepared from the root.

Fluid Substances.—Certain fluid substances supply some sources of drugs; for example, the "latex," a milky fluid obtained from the opium poppy, supplies our chief source of opium. Gutta-percha is also obtained from the "latex" of certain trees found in the Malay Archipelago. In some instances these fluids are dried and evaporated before use, such as the liquid drained from the leaf of the aloe plant.

Fixed Oils.—Fixed oils are extractions obtained by expression from vegetable or animal life.

Volatile Oils.—Volatile oils are mainly obtained by distillation, and are soluble in ether and chloroform. They have a characteristic odour, and an important class is formed by the terpenes, of which oil of turpentine is an example.

Resins.—Resins are produced by the oxidation of volatile oils.

Oleo-resins are solutions of resins in volatile oils. They are soluble in alkalies forming resins.

Balsams are oleo-resins which contain benzoic or cinnamic acid. Common balsams in use are balsams of Tolu and Peru.

Gums are yielded by certain families of trees and shrubs. They contain acid, a small amount of mineral matter, sugar, and nitrogenous matter. They are actually a protective coating found on the tree after it has been injured. Acacia gum is an example.

Gum-resins are exudates from plants consisting of a mixture of gum and resin with a volatile oil—*e.g.*, copaiba.

Active principles are contained in medicinal plants. They may be alkaloids or glucosides.

(a) **Alkaloids.**—These are nitrogenous bodies found in plants. They are soluble in alcohol, but rarely in water. All alkaloids terminate in "ine"—*e.g.*:

Morphine.

Lobeline.

Nicotine.

Atropine.

(b) **Glucosides or Glycosides.**—These are crystalline bodies which hydrolyse when acted upon by acids, breaking down into sugars and some other product. All glucosides terminate in "in"—*e.g.*:

Saponin.

Digitalin.

Digitoxin.

Strophanthin.

The Animal Kingdom.

A great number of drugs are obtained from the glandular structures of the body. We have many examples:

The suprarenal gland is the source of adrenaline and cortin.

The thyroid gland produces thyroxin.

The pancreas produces insulin.

The pituitary gland produces a number of extracts.

The liver is the source of dried liver extract.

The animal secretions which are used are those obtained from the above glandular structures, and also those obtained from the stomach—for example pepsin and dried stomach tissue. Secretion from the gall-bladder is also made use of in ox bile, and gelatine is obtained from the fibrous tissue and bones of animals.

Blistering fluid is obtained from the cantharides or Spanish fly, and possesses vesicant properties. The flies are collected, killed by ammonia fumes, and then dried.

Certain oils which are of animal origin are much used, such as cod-liver and halibut-liver oils.

The Mineral Kingdom.

From inorganic substances we obtain many of the chief drugs used. They are derived from metals and the non-metallic elements. They include the salts of sodium, potassium, ammonium, calcium, magnesium, bismuth, lead, silver, zinc, copper and iron. Pure metal itself is used—*e.g.*, bismuth. Mercury and its salts are used in a variety of ways. Arsenic and iron are other substances in use.

Certain acids are used which are divided into organic and inorganic acids. The inorganic acids include sulphuric, hydrochloric and nitric acids; the organic acids, acetic, citric and tartaric acids.

Synthetic Preparations.

Nowadays many drugs that were originally obtained from a natural source, the demand for which is greater than the supply, are supplemented by preparations possessing similar properties but artificially produced by chemical means. Such a drug is adrenaline. Many of the vitamins in use are prepared synthetically.

NURSES' AIDS TO MATERIA MEDICA

CHAPTER I

THE CARE AND THE ADMINISTRATION OF DRUGS

Materia medica is the name given to the material or substances used in medicine.

Therapeutics is the science and art of treating disease.

A nurse should have some knowledge of materia medica and therapeutics because the care of drugs and their administration form an important part of her duties. A nurse who becomes sufficiently interested in the subject will look up each drug as she meets it in her practical work, and will compile for herself a reference book. By making use of this, and combining it with her observation of the patient, she will acquire a real practical knowledge of the subject; and the more she applies herself to this particular branch of medical science, the further will her interest be stimulated.

The Care of Drugs.

For safety and for convenience, those drugs which are given to the patient by mouth, or which may be prescribed for any particular patient, are kept separate from those drugs which are used for external application only. The patients' medicines are kept in a special cupboard with stock mixtures, or they may be kept in a medicine trolley, or they may be placed in some place near each patient's bed.

Those drugs which are prescribed for external use only, are kept in a separate cupboard, being dispensed

in ridged bottles or bottles discernible by touch that they may not be confused with medicine bottles and all lotions, liniments and ointments must be labelled "Poison, for external use only."

All drugs should be kept in places which are accessible to the nursing staff but inaccessible to patients, and if possible out of their sight. They should be returned to these places after use, because the contents of a bottle left carelessly in the ward, bathroom or lavatory may be taken by a patient in accident or with suicidal intent.

The bottles must be kept scrupulously clean, and if a label has become soiled or illegible the bottle should be returned to the dispensary to be relabelled. Stock mixtures should be tested periodically, because many of these medicines will deteriorate on keeping and will lose their potency if kept for a long period in the ward.

The acquisition and administration of certain drugs are controlled by two Acts of Parliament, namely, the Dangerous Drugs Act and the Pharmacy and Poisons Act.

The Dangerous Drugs Act.

This Act applies to a number of drugs which are known to cause addiction, that is, the patient develops a craving for the drug. These are: opium and its derivatives, such as nepenthe and omnopon; morphine and its salts; diamorphine (heroin) and its salts; cocaine and its salts; extracts and tinctures of Indian hemp (*cannabis indica*); pethidine, phylseptone, dilaudid, dilaudid, metapon, heptalgin, dromoran. Other drugs may be added from time to time when the Act is amended. Medical practitioners must keep a register of purchases and a record of those supplied to patients. Chemists can issue these

to practitioners, veterinary surgeons and dentists, and to patients only on a written and signed prescription. Certified practising midwives may obtain supplies of opium preparations and pethidine for use in their practice and they must record all purchases and administrations. A record of these sales must be kept for at least two years.

In hospital wards the dangerous drugs are kept in a special poison cupboard. It must be kept locked and the key retained on the person of the sister or nurse who is in charge of the ward. Ward stocks of dangerous drugs can only be obtained from the pharmacist or dispenser on the receipt of an order written in a special order book signed by the medical officer and ward sister. They must be checked and signed for on being received from the dispensary and a duplicate of all such requisitions must be retained by the ward for two years.

Individual prescriptions containing a dangerous drug must be written by the doctor in charge of the patient on the patient's case sheet, and must be dated and signed by him. These prescriptions can only be dispensed once. Their administration must be checked by a second person. A careful record must be kept; the name of the patient, the amount of the drug given, the date and time when given, the names of the donor and witness—all these particulars must be entered in a book kept for this purpose.

The Pharmacy and Poisons Act.

This act controls a much larger number of drugs than the Dangerous Drugs Act.

Part of this act, the poisons list, gives the names of all drugs which are considered to be poisons. The act further divides these poisons into sixteen schedules, special regulations applying to each schedule. The

first and fourth schedules are of chief interest to nurse and examples of drugs which come under these categories are as follows:

Schedule I:

Aconite.	Hyoscyamus.
Amidopyrine.	Jaborandi.
Antihistamine substances.	Lead and its compounds.
Antimony preparations.	Lobelia.
Apomorphine.	Mercuric chloride.
Arsenic.	Mercuric iodide.
Atropine.	Morphine.
Barbituric acid, its salts and compounds.	Nicotine.
Belladonna.	Nux vomica.
Cantharides.	Opium.
Cinchophen.	Pethidine.
Cocaine.	Phenadoxone.
Codeine.	Picrotoxin.
Digitalis preparations.	Strophanthin.
Emetine.	Strychnine.
Ethyl morphine.	Sulphonah.
Ergot alkaloids.	Sulphonamide preparations.
Hyoscine.	Thallium.
	Tribromethyl alcohol.

Schedule IV:

Amidopyrine.
 Antihistamine substances.
 Barbituric acid, its salts and derivatives, and compounds of barbituric acid with any other substance.
 Cinchophen.
 Sulphonah.
 Sulphonamides.

It will be noted that all Schedule IV drugs are included in Schedule I, and that all dangerous drugs are included in Schedule I of this Act.

Schedule I poisons can be obtained from chemists only by signing the poison book, or on a prescription, whilst Schedule IV poisons can be obtained from chemists on presenting a prescription.

In a hospital, medicine containing a Schedule I poison (or Schedule IV poison, of course) can be obtained only from the dispensary on the written order of a doctor, dentist, sister or nurse in charge.

ward or department, and must be stored in a cupboard reserved solely for poisons.

Out-patients' prescriptions for medicine containing poisons must be written by a doctor or dentist.

Summary of Rules for the Keeping of Drugs.

1. Keep all drugs out of the patients' reach, and locked up.

2. Drugs for different purposes should be kept separate, in different parts of the drug cupboard, or in separate cupboards—namely:

(a) Drugs for internal use.

(b) Drugs for external use.

(c) Strong poisons.

3. Drugs for different purposes should be kept in bottles of differing shapes and colour, using blue and green bottles with six sides for poisons, so that they are distinguishable by both sight and touch; never put a strong poison into an ordinary medicine bottle.

4. Poisons should be marked for "external use," or "poison."

5. Keep bottles corked, or the medicine may become stronger or weaker through the escape of a volatile substance.

6. Keep oils in a cool place; also antitoxins, sera and gland derivatives.

7. All drugs must be labelled. See that the labels on the bottles show:

(a) The name of the patient.

(b) The quantity of the dose.

(c) The times at which it is to be given.

(d) The date of the prescription.

(e) That the bottle must be shaken.

8. Keep the drugs methodically in order of bed number or alphabetically.

9. When a bottle of tablets or one containing a mixture is to be replenished the remainder in the bottle should be sent with the bottle to the dispensary, or should be destroyed. It should never be left in an unlabelled container.

From time to time the stock of poisons in the ward is checked and inspected by the hospital dispenser. A list of the drugs included in the schedule and the rules relating to the Act should be kept inside the poison cupboard for reference.

Inspection of poisons comes within the Pharmacy and Poisons Act.

The Administration of Drugs.

In administering drugs the important facts to bear in mind are: that the correct medicine is given to the patient at the time at which it has been ordered; and that the nurse must watch the patient closely for any after-effects that may ensue.

All patients do not react in the same way. There may be some patients who are intolerant to a medicine. **Intolerance** is a condition in which the patient, owing to some peculiar inherent sensitivity, will react to some particular drug or ingredient in a mixture. This reaction may show itself in a number of ways. The patient may vomit, he may appear to be very flushed, there may be a rise in the temperature, or there may be a rash. After the first dose the reaction may be only slight, but after a subsequent dose has been given the drug is a definite poison to that patient; he may become very ill and death may occur. Thus it is important that the nurse should be aware of this danger when giving a new drug to a patient, and the patient must be closely observed after its administration, and any untoward signs and symptoms must be reported immedi-

ately. A further dose of the medicine should be withheld pending instructions from the medical officer.

Again, a patient may suffer from the effect of **cumulative** action of a drug. There are certain drugs which, on being given over a protracted period, may produce poisonous symptoms. This results from the fact that these substances, instead of being excreted, remain in the body and gradually produce these effects. The symptoms of intolerance to a drug and those of cumulative action may be very similar, except that the latter follows after long and continued medication, and it is these signs that a nurse should know so that she may observe and report their occurrence.

When giving drugs a nurse should bear in mind also that a patient may become tolerant to a drug. **Tolerance** indicates that a patient has become so used to a drug that in order for it to be effective the dose given has to be increased. The danger of tolerance is that the patient may become addicted to that particular drug, having become so used to it that he has developed a craving for it.

Under ordinary circumstances a nurse will give to the patient the drug that has been ordered. Sometimes the actual necessity for giving a drug will be left to the discretion of the nurse. This applies especially to the administration of sleeping-draughts, and in this matter the nurse must accept a certain amount of responsibility. The patient should not be allowed to acquire the habit of depending upon a sleeping-draught, a habit which he may continue on his return home from hospital and which may result in his becoming a drug addict. On many occasions sleep can be induced in the patient by nursing measures rather than by resort to the medicine bottle, and a nurse must always think of this fact before administering such drugs.

It will be seen from the foregoing that before an actual study of the drugs themselves can be made the nurse must realise her duties and responsibilities in the safe keeping and careful administration of drugs.

Rules for the Administration of Medicines.

1. Never give a medicine from an unmarked bottle or from one on which the label is illegible.
2. Read the label before and after pouring out a dose.
3. Check up with the patient's bedboard.
4. Shake the bottle by turning the bottle upside down with the finger on the cork.
5. Hold the cork in the bent little finger while pouring out the dose.
6. Hold the glass with the mark denoting the quantity to be given on eye level and marked by the thumb.
7. Pour out the dose with the label uppermost.
8. Never speak to or allow anyone to speak to you while measuring a dose.
9. Measure exactly the dose ordered.
10. Wipe the rim of the bottle with special cloth or sponge before replacing the cork and returning the bottle to the cupboard.
11. Give the dose at once after pouring it out, carrying it to the patient on a tray and stirring with a glass rod if there is a sediment; never allow one patient to take medicine to another, and never put down medicines in the ward within reach of the patients.
12. See that the patient drinks the medicine at once, never leaving it at the bedside for him to take.
13. Make all doses as palatable as possible: always give water (before if desired) after a dose. For unpleasant medicines use lemon, brandy, a piece of bread or a mouthwash to remove the taste. Boiled sweets are useful.

14. Give iron mixtures through a straw or allow the patient to brush the teeth immediately afterwards, as they blacken the teeth.

15. Never give two medicines at the same time without definite orders, as they may react with one another.

16. Medicines ordered "before food" should be given twenty minutes before a meal, and those labelled "after food" should be given immediately after the meal.

17. When the drug given is included in the schedule of "Dangerous Drugs" it must be checked by a second person, and entered in the poisons register.

18. After a drug has been given, watch carefully its effect upon the patient.

The Interpretation of Prescriptions.

When a doctor writes a prescription he must bear the following points in mind. The drugs included must be compatible one with another. One drug may have a good effect, but another given with it may either counteract its effect or combine with it, forming a poisonous substance. On the other hand, a combination with other drugs may result in greater effect. Again, an ingredient may have to be included to correct some undesirable effect of another ingredient; and, lastly, they must be conveyed in some convenient medium which will be palatable. Thus we find an average prescription will consist of:

- (a) A basis, which is the principal ingredient.
- (b) An adjuvant, which may enhance or hasten the action of the basis.
- (c) A corrective, which counteracts any undesirable effect either of the other drugs may produce.

- (d) A vehicle, usually some flavouring or colouring material.

There may be more than one adjuvant in the prescription, and there may be no necessity for a corrective. The prescription will be written in the following manner:

1. Superscription: \mathcal{R} , or recipe, "take."
2. Inscription: The names of the drugs included in the prescription and their doses.
3. Subscription: Direction to the dispenser as to the quantity and in what manner the prescription is to be made up—*e.g.*, fiat pilulae fiat mistura.
4. Signature: The directions to the patient—*e.g.*, one tablespoonful to be taken three times a day.

The prescription is signed with the initials or name of the practitioner and dated, and the patient's name is placed at the head of the prescription.

CHAPTER II

THE INTRODUCTION AND ABSORPTION OF DRUGS

DRUGS are introduced into the body in the following ways:

1. By mouth.
2. Per rectum.
3. By inhalation.
4. By injection.
5. By local application.

1. Drugs given by Mouth.

Drugs given by mouth may be given in the form of powders, pills, tablets, cachets and capsules, mixtures, tinctures, confections and syrups.

Powders (pulveres).—A powder consists of drugs which are ground to powder and mixed. They are usually dispensed in pieces of white folded paper, which vary in size with the amount of powder prescribed.

To give a Powder.—The contents of the paper may be sprinkled on the back of the patient's tongue, and a drink will then be given. A powder may be given with a little milk, or for a child it may be sandwiched in a piece of bread-and-jam.

Pills (pilulæ) are small round masses containing one or more ingredient. They may contain substances which cannot be prescribed in fluid form, and which are intended for slow absorption, or for their local action on the bowel. They are coated with sugar or some other substance such as gelatine. Keratin is used if the action of the pill is to be delayed until it reaches the small intestine. The pills may become hard on keeping, with the result that they may pass

unchanged through the alimentary tract. Pills should be given with a drink and should be swallowed whole.

A lozenge (trochiscus) contains an active ingredient incorporated with sugar. It is flat, and may be oval, oblong or disc-like in shape. It should be sucked slowly.

Tablets (tabellæ) are drugs in compressed form, prepared for oral administration or for hypodermic injection. When given by mouth, they may be taken whole, or they may be crushed and taken with milk or water. Some are coated with chocolate or made from a chocolate base. The latter should be broken up in the mouth, as the drug they contain is absorbed by the oral mucosa.

Cachets and Capsules (capsulæ).—If a nauseating drug has to be given, and in some cases an insoluble drug, it is often introduced in the form of a cachet or capsule. A cachet is made of two circular plate-like discs of rice paper which are moistened and placed together, enfolding some dry ingredient. When giving a cachet, it should be moistened, given with a drink, and swallowed whole.

A capsule is either pear-shaped or cylindrical, and is made of gelatine. It contains either a fluid or solid ingredient and should be swallowed whole by the patient. Again it may be coated with keratin if its action is to be delayed until it reaches the intestine.

A mixture (mistura) is one of the common ways in which drugs given by mouth are dispensed. It consists of drugs which are soluble in water, or of insoluble powders held in suspension in water by the addition of certain mucilages.

When giving a mixture, the bottle should be shaken well first, the dose measured with the medicine glass held on a level with the eye and at the lowest

point of the curve of the meniscus. The dose should be taken immediately by the patient before the contents of the mixture have had time to precipitate.

A draught (haustus) is a mixture which is prescribed to be taken once only.

A tincture (tinctura) is the solution of a substance usually in alcohol. It may be either simple, containing one active substance, or compound, containing more. When a small dose of a tincture is to be given, the drops may be placed on a lump of sugar, or the tincture may be incorporated in a mixture.

A confection (confectio) is a soft preparation containing drugs which are mixed with syrup or honey.

A linctus is a thin syrupy confection which is sipped slowly by the patient and given for its local effect upon the throat.

A syrup (syrupus) is a saturated solution of sugar containing flavouring, colouring, and a therapeutically active substance.

2. Drugs given per Rectum.

Drugs are given per rectum in the following circumstances:

- (a) If they are nauseating when given by mouth.
- (b) In conditions of unconsciousness as general sedatives.
- (c) As anæsthetics.
- (d) For their local effect in treatment of inflammation, colitis, and for the relief of pain.

They are given in the form of a suppository or as an enema.

A suppository (suppositorium) is a conical body composed of the active ingredient and cocoa butter or gelatine. These substances are used because they melt at body temperature.

The suppository should be lubricated and inserted

into the rectum with the gloved finger. Pressure should be applied over the part for a few minutes afterwards.

When the drug is given in the form of an emulsion it is given in saline solution, or in olive oil, or in some mucilage, as starch. It should be given slowly by means of a fine catheter, tubing and funnel.

Drugs given in this manner may take any time from ten minutes to an hour to become absorbed, and the dose prescribed is usually twice that given by mouth.

3. Drugs given by Inhalation.

Certain volatile substances may be inhaled from a mask or from a handkerchief. Some are vaporized with hot water and are given by means of an inhaler. When giving the latter, the receptacle should be heated and the water should be at a temperature of 160° F.* If the drug is soluble it is placed in the inhaler first and water is added, but if it is a resin or oil, then the water should be put in first and the drug added. Some drugs, as stramonium, are given by burning the powder in a saucer, collecting the fumes given off in a funnel, over which the patient inhales. They may also be given in cigarette form.

4. Drugs given by Injection.

The syringes and needles used for giving injections of any kind must be kept scrupulously clean and sterilised before use either in the autoclave or by boiling.

Drugs given by injection are more rapidly absorbed and are given in the following ways:

* At this temperature steam is formed. If boiling water is used there is a danger of the patient inadvertently scalding himself.

Subcutaneous (Hypodermic) Injection.—This is given under the skin and will consist of non-irritant drugs given in small doses.

Method of giving Subcutaneous Injection.—When giving a hypodermic injection, the nurse must keep the following points in mind:

Her hands should be surgically clean, and great accuracy must be observed in the measurement of the dose. If the drug to be given is in tablet form, it must be dissolved in 10 minims of warm sterile water. This can be effected by heating the tablet in a spoon containing the water, over a spirit lamp, or by crushing the tablet in a sterilised minim measure of water with a glass rod. Alternatively, it may be crushed in the barrel of the syringe with the piston and made into solution on drawing up the water into the syringe.

Care must be taken before giving the injection to see that the tablet is completely dissolved, that none of the solution obtained is lost, and that no air bubbles are present in the syringe. The site of the injection must be cleansed previously with a swab moistened with spirit, and slight massage should be applied in an upward direction by means of a swab, over the puncture, after the injection has been given. When giving the injection a fold of skin should be taken between the thumb and first finger of the left

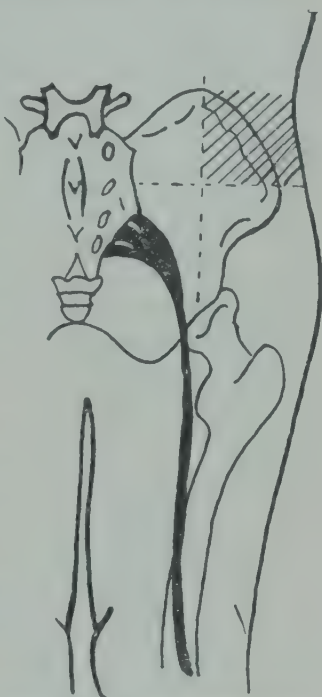


FIG. 1.—INTRAMUSCULAR INJECTION.

hand, the needle should be held parallel with the skin and the injection made into the subcutaneous tissue.

Intramuscular Injection.—When a dose of large bulk is to be given as in the case of sera, or a drug which might prove irritating, this route is adopted. The drug is given deep into a muscle, the sites commonly used being the deltoid, the outer side of the thigh (the vastus externus), and the gluteal region. The needle used should have a long bevel, be standard wire gauge 22 and be 2 inches in length.

The skin should be stretched and the needle plunged in almost at right angles to the surface. When giving an injection into the buttock care must be taken to avoid nerves and vessels in this region by giving it in the upper and outer quadrant as shown in the shaded area in Fig 1. In this area, close to the intersecting dotted lines, intramuscular injections can be given without affecting the sciatic nerve.

Intravenous Injection.—Drugs given by this method are more quickly absorbed than when they are given by any other route.

They are given—

- (a) In conditions of collapse when the immediate effect of the drug is imperative—*e.g.*, coramine.
- (b) As a stimulant and as a means of introducing fluid, as in a rapid or continuous infusion of saline.
- (c) When the drug would prove irritating if given by any other route—*e.g.*, arsenic preparations.
- (d) To produce anæsthesia—*e.g.*, sodium pentothal.
- (e) For diagnostic purposes in X-ray and renal efficiency tests.

Intrathecal Injection.—Drugs are introduced into the spinal theca after lumbar puncture. This is one method of giving sera. Drugs are also introduced by this method for X-ray purposes—*e.g.*, lipiodol—and for treatment—*e.g.*, streptomycin for tuberculous meningitis.

Intradermal Injection.—This is given into the layers of the skin. The Schick and Dick tests and protein sensitivity tests are performed in this manner.

5. Drugs given by Local Application to Skin and to Mucous Surfaces.

Certain drugs are prescribed for their local action on the skin or mucous surfaces.

Gargles and mouthwashes have an antiseptic, anodyne or astringent effect, and are used for the treatment of local conditions in the mouth.

Drops.—Drugs are instilled into the eye in the form of drops (*guttæ*) and into the ear (*auristillæ*).

Lamellæ are gelatine discs containing some drug, and are inserted for their local effect under an eyelid.

Lotions or Solutions.—These contain substances in solution or in suspension. They are used for their antiseptic or soothing effect, and may be applied externally on lint or may be used for the irrigation of wounds and cavities, or as wet dressings.

A liniment (linimentum) is an embrocation which is either painted on to the skin surface or is used as an anunction. Liniments contain either camphor, oil or soap. They are usually counter-irritant in their action.

An ointment (unguentum) is usually a fatty or greasy base incorporating some drug for its therapeutic effect. This base is usually lard, suet, paraffin or anoline. The fat is gradually absorbed, delaying the effect of the drug locally. Ointments are applied spread on pieces of lint or may be rubbed into the skin.

A paste (pasta) is a combination of fat with powder with the powder predominating, and is chiefly in the treatment of skin diseases where there is inflammatory exudate. The powder absorbs the secretion, allowing the full action of the drug contained in the fat on the inflamed area.

Poultices (cataplasmata) and **plasters (emplastra)** are applied to relieve pain, to induce hyperæmia, and to act as counter-irritants.

Powders may be used locally on the skin as dusts. Powders or certain kinds may be blown into cavities, as the ear, the nose, or on to the conjunctival membrane in the form of **insufflations**.

Bougies and **pessaries** are the means whereby drugs are introduced into the bladder and the vagina. They are prepared in much the same way as a suppository, and they produce either local or general effects.

Tampons are made of wool and gauze impregnated with some medicinal substance for insertion into vaginal and nasal cavities.

CHAPTER III

DRUGS AFFECTING THE ALIMENTARY SYSTEM

THE STOMACH

DRUGS given for their effect upon the stomach include:

1. Emetics.
2. Gastric sedatives.
3. Gastric tonics.
4. Carminatives.

1. Emetics.

Vomiting is produced by the stimulation of the vomiting centre in the medulla and the active contraction of the muscles of the abdomen.

An **emetic** is a drug which causes a person to vomit. It acts in two ways:

(a) *Central emetic*, a drug which stimulates the vomiting centre directly.

E.g., **Apomorphine hydrochloride**, an alkaloid of morphine. Dose $\frac{1}{32}$ to $\frac{1}{8}$ gr. by hypodermic injection.

This is the most powerful hypodermic emetic known. It is given in conditions of poisoning, when the poison ingested cannot be removed by gastric lavage. It is very rapid in its effect, vomiting occurring ten to fifteen minutes after the injection.

(b) *Reflex Emetics*.—These stimulate sensory nerve endings in the stomach and, reflexly, the vomiting centre. The substances commonly used are sodium chloride, mustard and water and ipecacuanha.

Tinctura ipecacuanhæ, obtained from ipecacuanha root. Dose $\frac{1}{2}$ to 1 fluid ounce as an emetic.

Ipecacuanha præparata. Dose 15 to 30 gr.

This drug, on account of the irritant effect of its

active principle emetine, produces vomiting in 20 to 30 minutes. It may be given to children with bronchitis to help them by the act of vomiting expel mucus from the respiratory passages.

Sodii chloridum (sodium chloride, common salt). Dose 2 tablespoonsful in a tumbler of warm water.

This drug produces vomiting by irritation of the gastric mucosa.

Mustard, dose 1 tablespoonful in a tumbler of warm water.

Copper sulphate, dose 5 to 10 gr.

Zinc sulphate, dose 10 to 30 gr.

These substances are also emetics, but are rarely used. The former is used in conditions of phosphorus poisoning.

2. Gastric Sedatives.

Gastric sedatives may be divided into:

(a) Anti-emetics.

(b) Antacids.

(a) **Anti-emetics** are drugs given to relieve vomiting. They include:

Atropine, an alkaloid of belladonna root.

Atropine sulphate. Dose $\frac{1}{240}$ to $\frac{1}{60}$ gr. by hypodermic injection.

This drug paralyses the secretory vagal nerve endings, and for this purpose it is administered before anæsthetics.

Chlorodyne (tinctura chloroformi et morphinae). Dose 5 to 15 minims.

Chlorbutol or **chloretone**. Dose 5 to 20 gr.

This drug is given to relieve vomiting of all kinds. It is given by mouth and has a local anæsthetic effect on the gastric mucous membrane.

Dilute hydrocyanic acid. Dose 2 to 5 minims.

This drug acts as a gastric sedative by paralyzing

sensory nerve endings, and is given in the treatment of vomiting occurring in gastric ulcer and vomiting associated with nervous conditions.

(b) **Antacids.**—These are drugs which neutralise gastric acidity or check its secretion and allay muscle spasm and pain. They include:

Sodium bicarbonate.

This is given after a meal to relieve pain due to hyperacidity. It must be administered very frequently if it is to maintain an effective antacid action. There is therefore a danger of its producing an alkalosis.

Magnesium salts.

Magnesia and magnesium carbonate are used as antacids usually in combination with calcium carbonate which checks the tendency to diarrhoea which magnesia produces.

Magnesium trisilicate is made from magnesium sulphate and sodium silicate; it is an effective antacid and is widely used in the treatment of peptic ulcer.

Bismuth carbonate is used in conjunction with magnesium carbonate. Its action is purely protective and sedative. It forms an insoluble coating over the gastric mucous membrane which protects it from the irritation by the food and from the action of the gastric juice.

Colloidal aluminium hydroxide is the basis of the proprietary preparation Aludrox.

Belladonna (Tinctura belladonnæ). Dose 5 to 30 minims.

This drug is given in the treatment of gastric and duodenal ulcers to prevent secretion. It relieves pain in the stomach by lessening the activity of the involuntary muscles.

“Eumydrin” (atropine methylnitrate). Dose 5 ml. of a 1 in 10,000 aqueous solution given half an hour before each feed.

Eumydrin is supplied in tablets containing 0.05 gramme. One tablet dissolved in 10 ml. of water makes 1 in 10,000 solution. The solution should be made freshly every few days.

This drug is given in conditions of congenital hypertrophic pyloric stenosis.

3. Gastric Tonics.

Gastric tonics are substances given to stimulate the appetite. They are divided into: Bitters, Alkalis and Acids.

Bitters are substances which increase the flow of saliva in the mouth and reflexly stimulate the secretion of the gastric juice. They are divided into simple bitters and aromatic bitters, the latter having a more pleasant taste. By increasing the appetite, bitters are of value as general tonics, and are used to increase the appetite of patients in convalescence. They are usually administered 15 to 20 minutes before a meal.

The bitters commonly used are:

Gentian, obtained from the dried rhizoma and root of *Gentiana lutea*. Dose 10 to 30 gr.

Quassia, obtained from quassia wood. Dose 2 to 8 gr.

Calumba root. Dose 10 to 30 gr.

These three drugs are usually given in a mixture in the form of an infusion or tincture.

Tinctura nucis vomicæ, made from the dried ripe seed of *nux vomica* tree. Dose 10 to 30 minims.

Strychnine, an alkaloid of *nux vomica*, is also used.

Alkalis are often given with bitters: *Mist. Gent.* and *Alk.*

Acid Substances.—These act in the same way as the bitters.

Hydrochloric acid in dilute form is the most commonly used. It stimulates gastric secretion and su-

plements the acid present in the stomach, and is given in conditions of hypochlorhydria and achlorhydria.

4. Carminatives.

Carminatives are drugs which relieve flatulence and colic by the expulsion of gas from the stomach. They act by stimulating the tone and movement of its muscles. They also relieve a feeling of fulness after a meal. Examples of carminatives are:

Dill water, prepared from dill fruit. Dose $\frac{1}{2}$ to 1 fluid ounce.

Peppermint, which is used to relieve gastric colic and flatulence in the following preparations:

Peppermint water (*aqua menthæ piperitæ destillata*). Dose $\frac{1}{2}$ to 1 fluid ounce.

Spiritus menthæ piperitæ. Dose 5 to 30 minims.

Oil of cajuput. Dose 1 to 3 minims.

Spirit of camphor. Dose 5 to 30 minims in water.

Charcoal, obtained from wood, is given in tablet or biscuit form. It absorbs gas produced in fermentation and is given in treatment of gastric ulcer.

Ginger is used in the following preparations:

Tinctura zingiberis fortis (strong tincture of ginger). Dose 5 to 10 minims.

Tinctura zingiberis mitis (weak tincture of ginger). Dose 30 to 60 minims.

Syrupus zingiberis (syrup of ginger: strong tincture in syrup). Dose 30 to 120 minims.

THE INTESTINES

Drugs affecting the intestines are divided into the following groups:

Sedatives.

Stimulants.

Purgatives and aperients.

Anthelmintics.

Nutrients.

Astringents and

Antiseptics.

Intestinal Sedatives.

The drugs included in this group act as:

- (a) Mechanical protectives.
- (b) Vagal depressants.
- (c) Carminatives.

(a) **Mechanical Protectives.**—These drugs, by forming a coating over the mucous membrane, hinder the absorption of toxic substances and prevent irritation of the intestinal wall. They are used in the treatment of diarrhoea. The drugs used are:

Bismuth salts combined with opium preparations which also relieve pain.

Kaolin, an aluminium silicate.

Chalk. Preparations used:

Pulvis cretæ aromaticus.

Pulvis cretæ aromaticus cum opio.

(b) **Vagal Depressants.**—These are drugs which paralyse the vagal nerve endings and relieve pain produced by spasmodic contraction.

Atropine acts by reducing spasmodic contraction and is given in the treatment of colic occurring in pyloric stenosis.

Hyoscyamus, obtained from henbane leaves, is frequently used combined with purgatives to mitigate colic.

(c) **Carminatives.**—Volatile oils are used because they relax muscle tone and diminish contractions which are due to gaseous stimulation.

Peppermint and chloroform are used.

Intestinal Stimulants.

Drugs which stimulate powerful contraction of the muscle are:

Pituitrin.

Physostigmine (eserine).

Acetyl-choline.

Esmodil, a parasympathetic stimulant, is a complex ammonium bromide compound causing increased peristalsis, and is used instead of pituitrin in cases of paralytic ileus. Dose 3 in 1,000 sol., 1 c.c. by injection.

Turpentine is given in conditions of meteorism and flatulence. It is antispasmodic in effect. Dose, by mouth 3 to 10 minims in capsule form; per rectum in the form of an enema $\frac{1}{2}$ to 1 ounce well mixed with soap solution or olive oil. It may also be given in a starch or gruel mucilage.

Purgatives and Aperients.

Aperients are drugs given to stimulate peristaltic action and to cause evacuation of the contents of the bowel. They are divided into the following groups:

1. **Laxatives**.—These produce their effect by increasing the bulk of the intestinal content and reflexly stimulating peristalsis. They take 8 to 10 hours to take effect, and are usually given to the patient at night before sleeping. Drugs given as laxatives include:

Paraffin.—Liquid paraffin, distilled from petroleum, acts as a lubricant and is not absorbed. Dose $\frac{1}{2}$ to 1 ounce.

Agar, a gelatinous substance obtained from seaweed; absorbing moisture, swells and increases bulk. Liquid paraffin and agar are frequently combined as in Agarol and Petrolagar.

Normacol.—A preparation of bassorin and sugar. Dose 1 to 2 heaped teaspoons once or twice daily after meals. The granules should be placed on the tongue and swallowed with a draught of water or tea. They should not be chewed.

2. **Vegetable Irritants**.—These produce a moderate

irritation of the intestinal mucous membrane. They are effective in 8 to 12 hours and produce no pain. They include:

(a) *Castor oil* (Oleum ricini, obtained from the seed of the castor oil plant). Dose 1 to 4 drachms.

It acts chiefly by irritation of the nerve endings in the small intestine, which reflexly causes increased peristalsis. It causes no pain and results in the evacuation of a soft loose stool.

(b) *The anthracene group.*

These cause direct stimulation of the intestinal muscle and are slow in action, taking 12 hours to take effect.

Aloes, obtained from the juice of the aloe leaves. It is prescribed in pill form with carminatives. It is slow in action and irritates hæmorrhoids if these are present.

Aloes pill 4 to 8 gr. Aloes and nux vomica pill (pilula aloes et nucis vomicæ). Dose, one pill.

Cascara is used in the treatment of chronic constipation and should not cause griping pain. It is most frequently given in the pill form, containing the dry extract and added carminatives.

Preparations used:

Cascara, obtained from the dried bark. Dose 30 to 60 gr.

Extractum cascaræ sagradæ liquidum. Dose 30 to 60 minims.

Mistura cascaræ sagradæ composita. Dose $\frac{1}{2}$ to 1 ounce.

Tab. cascaræ sagradæ composita (vegetable laxative tablets). Dose 1 to 3 tablets.

These tablets contain extract. cascaræ sagradæ sicc. with pulv. rhei and nux vomica.

Rhubarb (Rheum) is frequently used combined with magnesium carbonate and given in the form of **pulvis rhei co.** or **Gregory's powder** in the treatment

of mild gastro-intestinal derangements. Dose 10 to 60 gr.

Senna, obtained from the senna leaf, used in the following preparations:

Confection of senna (confectio sennæ), $\frac{1}{2}$ to 2 drachms.

Pulvis glycyrrhizæ compositus contains liquorice, sulphur and senna pod.

Mistura sennæ composita ("black draught") contains magnesium sulphate, extract of liquorice, infusion of senna, and aromatic spirit of ammonia. Dose 1 to 2 ounces.

Syrupus sennæ. Dose $\frac{1}{2}$ to 2 drachms.

Senna is also contained in syrup of figs, which is a preparation of figs, rhubarb, cascara and senna.

(c) *Drastic vegetable purgatives*.—These stimulate peristaltic action vigorously and sometimes produce pain, so they are combined with carminatives. Sometimes they produce a watery evacuation from the bowel and are then called *hydragogue purgatives* or *cathartics*.

Croton oil, obtained from croton seeds, is the most drastic of all purgatives. It acts very quickly, taking effect in 1 to 2 hours. Dose $\frac{1}{2}$ to 1 minim.

It was formerly given in conditions of unconsciousness, the dose of croton oil being placed in a small piece of butter on the back of the patient's tongue.

Jalap produces a watery evacuation from the bowel and is prescribed in conditions of œdema.

Preparations.

Pulv. jalapæ compositus contains jalap, acid potassium tartrate and ginger. It is used chiefly in cases of renal dropsy. Dose 10 to 60 gr.

Jalap Resin. Dose 1 to 5 gr.

Scammony has a similar action to jalap, but is more drastic and causes griping pain.

Colocynth, obtained from the dried pulp of the fruit. Dose 2 to 5 gr.

It is frequently combined with hyoscyamus because it is a gastro-intestinal irritant and produces much pain. It causes repeated watery evacuation in 1 to 2 hours after being given.

3. Non-vegetable Irritants.

Phenolphthalein. Dose 1 to 5 gr.

This is an irritant both of the small and large intestine and causes increased peristalsis. It is given in tablet form.

4. Mercurial Preparations.—These produce soft loose stools which are often grossly bile-stained. Mercury acts also as a mild antiseptic and is used in the following preparations:

Grey powder, or *hydrargyrum cum creta*, used for children with diarrhoea. Dose 1 to 5 gr.

Mercury pill, or “blue pill,” contains mercury and liquorice.

Mercurous chloride—calomel. Dose 1 to 4 gr.

This drug is very rarely used, but after a dose has been given it is customary to give the patient a saline aperient to wash out the bowel and prevent the absorption of mercury. Inflamed hæmorrhoids are an important contra-indication.

5. The Saline Purgatives.—They are not readily absorbed and retain water in the intestine, increasing peristalsis, and cause rapid transmission of the contents of the bowel. They are usually given in warm water before breakfast, being rapid in their effect and producing watery stools.

Examples of saline purgatives are:

Magnesium sulphate (Epsom salts). Dose $\frac{1}{2}$ to 4 drachms.

Sodium sulphate (Glauber's salts). Dose $\frac{1}{2}$ to 4 drachms.

Sodium potassium tartrate and **potassium acid tartrate**.

Mistura alba ("white mixture") contains magnesium carbonate 10 gr. and magnesium sulphate 60 gr. in each fluid ounce.

Seidlitz powder, or pulvis effervescens compositus. (Blue paper contains sodium potassium tartrate, sodium bicarbonate; white paper contains tartaric acid.) The contents of the blue paper are dissolved in warm water and those of the white paper are added.

Prostigmine, a synthetic chemical substance, is given to relieve distension and tympanites. It is given by mouth or by injection.

Anthelmintics.

Anthelmintics are drugs which are given to rid the bowel of worms. Some of them are given by mouth and some in enema form.

Tape Worm.—For treatment of tape worm the following drugs may be given:

Extract of **fili~~x~~ mas**, or male fern. Dose 45 to 90 minims. This is sometimes given in a capsule because of its nauseating effect. The patient should be starved for 2 days previous to the treatment; he may be given clear fluids. The night before the drug is given he should be given a purgative such as cascara. The drug is given in the morning, followed 2 hours later by a large dose of magnesium sulphate to prevent absorption of the fili~~x~~ mas.

Pelletierine tannate. This is obtained from the bark of the stem and root of the pomegranate. Dose 2 to 8 gr., followed 2 hours later by a purgative. It should be given on an empty stomach.

Hook Worm.—For treatment of hook worm the following drugs may be given:

Carbon tetrachloride. Dose 30 to 60 minims, followed in 2 hours by magnesium sulphate. It is

given in milk or in gelatine capsules and must be swallowed whole.

Oil of chenopodium, which is obtained from the American wormseed. Dose 3 to 15 minims. It is sometimes combined with carbon tetrachloride. It is also used in the treatment of thread and round worms.

Thymol is another substance used for hook and round worm. The drug should be preceded and followed by magnesium sulphate. Dose 3 to 30 gr.

Tetrachlorethylene is a colourless liquid used in the treatment of hook and round worms. It is given in capsules. Dose 3 to 4 ml. Magnesium sulphate should be given with the capsule. There is no necessity for preliminary fasting.

Round Worm.—**Santonin** 1 to 3 gr. is frequently prescribed. It is given in powder form, followed by a purgative such as jalap, 2 hours later. The effect of santonin is to loosen the hold of the parasite in the intestine so that it is easily expelled by the action of the purgative. In its excretion, santonin causes the urine and faeces to have an orange colour. It sometimes causes yellow vision, especially when an overdose is given.

Hexyl resorcinol (trade name caprokol). This is given in gelatine capsules, as it may cause burning and ulceration of the epithelium of the mouth. Dose 1 gramme. The capsule is given first thing in the morning on an empty stomach. Two hours later a purgative, such as magnesium sulphate, should be given.

Thread Worms.—Drugs used to treat these are given in enema form and consist of:

Infusion of quassia 5 per cent. solution.

Hypertonic saline 5 per cent. solution.

Turpentine. 2 to 3 drachms are added to a starch and-water enema.

The use of repeated enemata is unwise in children.

and the treatment has been largely replaced by the following drugs given by mouth:

Gentian violet pills. Dose, adults 60 mg. three times daily; children 10 mg. for each year of age given in three doses during the day. This drug is administered for 10 days followed by a second course after an interval of 10 days.

Diphenan (Butolan). Dose 7 to 15 gr. daily for 6 days.

Nutrients.

Drugs given for their nutrient effect are given in the form of a nutrient enema. This enema will consist of normal saline with glucose 5 to 10 per cent.

Astringents and Antiseptics.

Certain astringent substances are given to check diarrhoea and hæmorrhage occurring in colitis and dysentery. They are given in the form of an enema. The chief substances used are:

Tannic acid obtained from oak gall, used in 0.02 per cent. solution.

Silver nitrate 1 per cent.

"Albargin," a preparation of silver.

"Yatren," chiniofon. Dose 75 gr. in a 2½ per cent. solution.

Antiseptic enemas are also given consisting of boracic 4 per cent. and potassium permanganate 0.2 per cent.

Sulphaguanidine, **Succinylsulphathiazole** (**Sulpha-suxidine**) and **Sulphathalidine** are sulphonamide preparations which are given in the treatment of intestinal disease as bacillary dysentery and typhoid fever.

Sulphaguanidine is poorly absorbed from the

intestine and remains in the colon, exerting a bacteriostatic effect thereon. The average dose given is 12 grammes per day, but larger doses may be given.

Succinylsulphathiazole is chiefly of value in its power of bringing about a reduction in the number of *B. coli* in the intestine. It is therefore given prior to operations on the intestine. It is also used in the treatment of gastro-enteritis and ulcerative colitis.

Treatment of Amœbic Dysentery.

Emetine, an alkaloid of ipecacuanha root, is the most effective drug used in the treatment of amœbic dysentery.

Dose, one grain of emetine hydrochloride daily.

This is given for 10 days by hypodermic injection. Toxic effects are common and consist of nausea, vomiting and diarrhœa. Vertigo may occur. Emetine may have a serious effect upon the heart muscle, causing heart failure.

THE RECTUM

An infusion of sulphathalidine may be given before rectal operations; it is given after a rectal wash and is to be retained: dose $7\frac{1}{2}$ gr. in 100 c.c.

Drugs are given in suppository form for their local effect upon the rectum.

Antiseptic suppositories may be used, as phenol and iodoform.

Morphine suppositories are used for the relief of pain.

Belladonna suppositories are given to relieve spasm.

A glycerine suppository may be used as a lubricant in the treatment of constipation to facilitate the evacuation of hard masses of fæces.

Local Astringents.

Extractum hamamelidis liquidum, obtained from witch hazel, is used as a local astringent for treatment of hæmorrhoids. It may also be used as an ointment. Suppositories of **plumbi cum opio** are used for their sedative as well as for their astringent effect.

CHAPTER IV

DRUGS AFFECTING THE CIRCULATORY SYSTEM

DRUGS WHICH AFFECT THE HEART

Cardiac tonics are drugs which increase the force of the contraction of the heart muscle and have a tonic effect thereon.

Digitalis (foxglove).

This is used chiefly in the treatment of patients suffering from cardiac failure and auricular fibrillation. It stimulates the vagus nerve and exerts a mild poisoning effect upon the conducting mechanism between the auricles and the ventricles, and causes the muscle fibres of the heart to undergo more powerful contraction. Thus the pulse is decreased in rate, but increased in force. In dropsical cases it increases the flow of blood to the kidneys, and so the output of urine is increased.

The **poisoning** effects are:

1. Nausea, vomiting and anorexia.
2. Giddiness.
3. Irregularity of the pulse beat, which shows itself in "coupling" of the beats.
4. Diminution in the amount of urine secreted.



FIG. 2.—FOXGLOVE.

Preparations of digitalis in use :

Digitalis folia, obtained from digitalis purpurea leaf, given by mouth. Dose $\frac{1}{2}$ to $1\frac{1}{2}$ gr.

Tinctura digitalis, prepared from digitalis. 5 to 15 minims.

Digitoxinum, the essential glycoside of digitalis purpurea. Dose $\frac{1}{600}$ to $\frac{1}{80}$ gr. by injection.

Digitalinum. Dose $\frac{1}{15}$ to $\frac{1}{8}$ gr. by injection.

Digoxin is a crystallised glycoside obtained from the leaves of *Digitalis lanata*. It is a very valuable member of the digitalis group and invaluable in the treatment of auricular fibrillation when rapid action is desired. It is given intravenously and by mouth.

Dose: Initial dose 0.75 mgm. to 1 mgm. by intravenous injection. Maintenance dose 0.25 mgm. or twice daily by mouth.

Strophanthus, obtained from the strophanthus seeds.

This drug has the same effect as digitalis, but is more irritant and is more rapidly absorbed. It is used in the following preparations:

Tinctura strophanthi. Dose 2 to 5 minims.

Strophanthin by intramuscular or intravenous injection. Dose $\frac{1}{250}$ to $\frac{1}{80}$ gr. intravenously.

Ouabain, a crystalline glycoside obtained from *Strophanthus gratus*. Dose $\frac{1}{120}$ gr. intravenously.

Squill.—This drug also resembles the action of digitalis, but is more irritant and has a less powerful effect.

Guy's pill (Pill Digitalis Co.), a combination of digitalis, squill and mercury. One pill contains each of powdered digitalis leaves, powdered squill and mercury pill.

Quinidine sulphate, an alkaloid of cinchona bark. This has a different action from that of digitalis and is used mainly to restore normal rhythm in selected cases of auricular fibrillation. Great care must

exercised in its administration. The patient must be absolutely at rest and the pulse rate must be recorded accurately.

Toxic effects.—Tachycardia followed by ventricular fibrillation, rash and embolism.

Dose 3 to 10 gr.

Pronestyl (Procaine amide-hydrochloride) is prescribed for patients suffering from ventricular tachycardia and auricular and ventricular arrhythmias.

The toxic effects of the drug may be anorexia, nausea, vomiting, diarrhoea, headache, fever, itching and rashes. Very rarely agranulocytosis and leucopenia may occur, therefore a blood count should be done at regular intervals during its administration. It is usually given orally in doses varying in amount according to the condition for which it is prescribed.

It should never be given in conjunction with the sulphonamides or to patients with a history of bronchial asthma.

Heart Stimulants.

The following drugs are given in conditions of collapse as cardiac stimulants. They are chiefly stimulants of the nerve centres in the medulla.

Nikethamide (Coramine) (Anacardone).—This may be given by subcutaneous or by intravenous injection. It may also be given by mouth. Dose 250 mg. in 1 c.c.

Adrenaline is given intravenously or into the right ventricle.

Aminophylline (theophylline with ethylenediamine) is used as a cardiac stimulant and is useful in controlling Cheyne-Stokes respiration in cardiac failure. It may also be used for controlling anginal attacks and for the relief of cardiac pain. It is also an extremely valuable measure in the treatment of severe bronchial asthma (status asthmaticus).

Preparation:

"Tab." aminophylline for oral administration.

Dose 0.1 gramme (gr. $1\frac{1}{2}$).

Ampoule 0.5 gramme (gr. $7\frac{3}{4}$) in 2 c.c. by intramuscular injection. Ampoule 0.25 gramme (gr. $3\frac{3}{8}$) in 10 c.c. by intravenous injection.

DRUGS AFFECTING THE BLOODVESSELS

These are divided into:

(a) Vaso-constrictors.

(b) Vaso-dilators.

(a) **Vaso-constrictors** are drugs which constrict the bloodvessels and cause an increase in the blood pressure.

Adrenaline, or **epinephrine**, is obtained from the suprarenal gland or made synthetically. It is used in the treatment of patients suffering from shock and collapse, and is given specifically in the treatment of anaphylactic shock. In cases of collapse it is best given by intravenous infusion in normal saline.

Pituitary Extract.—Posterior pituitary fluid obtained from the posterior lobe of the pituitary gland. The active principles of this are **vaso-pressin** and **oxytocin**. An injection of "pitressin," a preparation containing vaso-pressin, causes a prolonged rise in the blood pressure. It is given especially in the treatment of surgical shock due to hæmorrhage.

Pholedrine (Veritol) is of similar chemical composition to adrenaline, but has a more sustained and consistent action. It restores the tone of the arterioles and is given to patients suffering from surgical shock. It has no toxic effects.

Dose 0.75 c.c. by intramuscular injection; 0.2 c.c. or 0.25 c.c. by intravenous injection.

(b) **Vaso-dilators** are drugs which dilate the bloodvessels, causing a fall in the blood pressure.

Amyl nitrite. Dose 2 to 5 minims.

This is given during an attack of angina pectoris to cause dilatation of the coronary artery. The drug is contained in a capsule which is broken in a handkerchief or piece of wool; the vapour is absorbed into the circulation through the lungs. The drug brings instant relief of the pain, but the patient experiences a sensation of flushing and fulness and sometimes headache brought about by the dilatation of the arterioles.

Glycerylis trinitratis: Solution of nitroglycerine (trinitrin).—The action is more prolonged than that of amyl nitrite.

Liquor glycerylis trinitratis or liquor trinitrin. Dose $\frac{1}{2}$ to 2 minims.

Tabelæ glycerylis trinitratis (trinitrin tablets). Dose 1 to 2 tablets.

These tablets are given orally; they should be chewed and dissolved in the mouth.

There are certain drugs which are used in the treatment of diseases of the peripheral arteries which have the effect of causing dilatation of the artery. One such drug is "**Padutin**," a proprietary preparation used in the treatment of Raynaud's disease.

Another drug which is used is **Priscol**, given in the treatment of peripheral vascular disorders with vasospasm, as arteriosclerosis with intermittent claudication.

Nicotinic acid may be given to people suffering from chilblains.

Drugs used in Conditions of High Blood Pressure.

Pentamethonium (Lyntensium).

Hexamethonium (Vegolysen).

These drugs have been used in the treatment of patients with severe hypertension and produce a

fall in the blood pressure with relief of the symptom.

Dose 250 mg. orally, increasing gradually to grammes per day. 25 mg., increasing to 100 mg. by injection.

The patient should be under strict medical supervision during treatment, particularly when the drug is given by injection. The toxic effect may produce an excessive fall in the blood pressure.

Veriloid tablets obtained from *Veratium viride* are given in doses of 9-15 mg. daily.

Drugs used in the Treatment of Varicose Veins.

Ethanolamine oleate.

Sodium morrhuate.

Quinine hydrochloride and urethane.

Phenol, 5 per cent. in almond or olive oil.

These substances are injected into the vein to cause sclerosis of the endothelium, clotting and obliteration of the varicose vein.

DRUGS AFFECTING THE BLOOD

Hæmatinics are drugs which increase the iron content of the blood. Hæmoglobin contains an iron-containing pigment, hæmatin, and these drugs increase the amount of hæmatin present in the blood. The chief drugs used for this purpose are:

Ferrum (Iron).—Iron is used in the treatment of all varieties of anæmia. It is absorbed in the duodenum and taken to the spleen. It is then stored in the liver until it is made into hæmoglobin by the bone marrow. When giving iron by mouth, a straw should be used to prevent the iron coming in contact with the teeth.

Preparations in use are:

Blaud's Pill, or *Pilula ferri carbonatis*. Dose 5 to 30 gr.

Ferri et Ammonii Citras. Dose 20 to 40 gr.

Compound ferrous sulphate tablets. Dose 1 to 2 tablets three times a day.

These tablets contain copper and manganese. Small doses of copper and manganese given in conjunction with iron help in its absorption.

Liver Extracts.

Liver preparations are used in the treatment of anæmia, especially for pernicious anæmia. Liver contains hæmopoietin, a factor which forms reticulocytes. Hæmopoietin is formed by the interaction between the "intrinsic" factor, a substance secreted by the mucous membrane of the stomach, with the "extrinsic" factor which is obtained from the food. Preparations of liver in use:

Dry or liquid extract given by injection or by mouth.

Proprietary preparations as anahæmin, campolon, hepastab and Lederle's liver extract. They are given by intramuscular injection.

Desiccated hog's stomach ("ventriculin") is used as a hæmatinic. It also contains hæmopoietin and is given by mouth in milk or fruit juice. It is given for the treatment of pernicious anæmia.

Vitamin B₁₂ is also given for this condition.

Folic acid, a factor of vitamin B, is also concerned in the production of red cells and is given in the treatment of pernicious anæmia. It does not, however, affect the central nervous symptoms.

Drugs which influence Leucocytes.

Drugs given to increase the formation of leucocytes:

Sodium nucleinate 5 per cent. solution given either by mouth or by intramuscular injection.

Pentose nucleotide 8 per cent. solution given by intramuscular injection.

Drugs given to reduce the number of leucocytes:

Benzol in olive oil is given in capsule form.

Drugs influencing Cell Metabolism.

Urethane ethyl carbamate is given in conditions chronic myeloid leucæmia. It produces a reaction in the number of immature white cells and a rise in the hæmoglobin level. It may also be given in multiple myeloma.

The dose is 2 to 5 grammes daily, given in enteric coated tablets. The toxic effects may be nausea and vomiting.

Mustard gas (dichloroethylsulphide) is an oily liquid, soluble in most oils.

Nitrogen mustards are closely related in chemical and physical properties to mustard gas, being **chloroethylamines** or R 48. R 48 has a cytotoxic antagonistic effect on the cells of endothelial lymphoid tissue, bone marrow and intestines, producing leucopenia. It may produce temporary good effects in patients suffering from Hodgkin's disease, chronic myeloid leucæmia and in cases of tumours of the lymphatic and blood-forming organs.

It is given intravenously in a fast-running drip infusion because it may produce venous thrombosis.

Dose 0.1 mgm. per kilogram of body weight given four times a day.

The toxic effects are severe nausea and vomiting and excessive damage to bone marrow, causing anæmia, disappearance of white cells, reduction of blood platelets and purpuric hæmorrhages.

Aminopterin and **amethopterin** are substances which are folic acid antagonists and when given may sometimes produce a temporary remission in acute leucæmia.

They are given in doses of 1 to 2 mgm. daily by mouth or by injection.

Toxic effects readily occur and cause diarrhoea.

nausea, vomiting and damage to the bone marrow and bleeding of the gums.

Radiophosphorus and other radio-active isotopes have been used in polycythæmia vera and chronic leucæmia.

Diamidines, one of which is stilbamidine, are used in the treatment of patients with multiple myeloma

Drugs given for the Treatment of Hæmorrhage.

A *hæmostatic* is a drug which is given to control bleeding. When it is applied locally to the bleeding surface it is known as a *styptic*.

Styptics:

Adrenaline applied locally causes constriction of the bloodvessels and arrests bleeding. It is used in the treatment of epistaxis and bleeding from a tooth socket. It is also given with local anæsthetics to prevent undue hæmorrhage. It localises the action of the anæsthetic, and intensifies and prolongs the anæsthesia by diminishing the circulation, thus preventing the rapid destruction of the anæsthetic in the tissues.

Some preparations contain adrenaline and cocaine, an example of which is "Codrenine." This preparation is used for its local anæsthetic and hæmostatic effect.

The preparation of adrenaline most commonly in use is **liquor adrenalinae hydrochloridi**, 1 in 1,000 solution.

Ferric chloride, 15 per cent. solution in water, is used locally for superficial wounds. It is applied on a small piece of cotton-wool.

Tannic acid, applied locally, acts as a styptic by precipitating protein of blood, and helps in coagulation. It is applied in powder or ointment form.

Snake venom (Russell's viper venom, **stypven** or

rusven) is used in the treatment of hæmorrhagic cases of hæmophilia. It is the most powerful styptic used. It is used in weak solutions of 1 in 10,000 or 1 in 100,000 applied locally on a pledget of wool.

When kept in solution it deteriorates rapidly and is therefore supplied in crystalline form.

Hæmostatics:

Morphine and **opium** are not directly hæmostatic in action, but they are given in cases of hæmorrhage because of the sedative effect produced, allaying restlessness on the part of the patient.

Drugs given for Control of Uterine Hæmorrhage

Ergot and **ergometrine** cause powerful contraction of the uterus and are used in post-partum hæmorrhage. Ergot is given either intravenously or intramuscularly and then by doses given orally.

Pituitrin extract, obtained from the posterior pituitary gland, is given to ensure contraction of the uterus and avoidance of post-partum hæmorrhage by virtue of its principle **oxytocin**.

Drugs given to Increase the Coagulability of Blood

Calcium is chiefly given in the form of:

Calcium lactate.

Calcium chloride.

Calcium gluconate.

These are given to the patient as prophylactic measures before operation to improve the coagulability of blood, especially before operations on the gall bladder.

Calcium chloride. 5 to 10 per cent. is given intravenously.

Calcium gluconate is given either intravenously or intramuscularly.

Vitamin K controls the prothrombin content of the blood and is used in cases of excessive hæmorrhage and in obstructive jaundice.

“**Kapilon**,” a synthetic preparation similar to vitamin K, is used. This is given by intramuscular or intravenous injection.

Synkavit is another preparation of vitamin K which is commonly used.

Tissue and serum preparations are also used to control hæmorrhage. Normal horse serum is given in the treatment of hæmorrhage from gastric ulcer.

Dose, 20 mil. in water, three times a day.

It is also used locally and given subcutaneously.

Coagulen is obtained from bovine blood platelets and is given by subcutaneous injection and intravenously.

Gelatin.—This may be given for controlling internal hæmorrhage from the kidney or lung and is given orally. It may be given by subcutaneous injection to promote clotting in aneurysm. It is applied locally in the form of gelatin sponge to control bleeding in neuro-surgery and as gelatin tissue to apply to a cut surface of the liver.

Anticoagulants.

Hirudin, obtained from the leech, has very powerful anticoagulant properties. It is sometimes used instead of sodium citrate to keep blood in fluid state.

Heparin, a complex carbohydrate substance obtained from the liver or the lung, is the normal anticoagulant in the body. It inhibits the formation of thrombin in the blood. It can be used instead of sodium citrate in blood transfusion, and as an anticoagulant when taking blood for various blood tests. It is also used to prevent clotting in continuous intravenous therapy.

It is used in the prevention and treatment of operative thrombosis and for treatment of thrombosis of other sites, including coronary and caval sinus thrombosis.

Administration: Heparin cannot be given by mouth; it is given by injection by either the subcutaneous, intravenous or intramuscular routes.

Dose 100 mg. initially, 50 mg. 4-hourly.

It has an immediate and short-lasting effect and therefore must be given in continued doses. It also prolongs the clotting time of blood, and an estimation of this must be done daily.

Dangers of heparin: It may cause hæmorrhage from any site, in particular hæmaturia, and it may also produce collapse which may prove fatal.

Antidote: Protamine sulphate, 1 per cent. solution, given intravenously, or immediate blood transfusion.

Dicoumarol is the active principle of spoiled sweet clover. It is prepared synthetically and prevents the formation of prothrombin. It is used in conjunction with heparin in the treatment of venous thrombosis.

Dose: Initial dose 300 mg. orally, 50 to 200 mg. daily.

Its action is prolonged and the prothrombin in the blood and clotting time of blood must be estimated daily. The danger of giving dicoumarol is again hæmorrhage, but in this case it may be delayed. The treatment is to give vitamin K 60 to 100 mg. intravenously or immediate blood transfusion. The drug should not be given to patients with kidney or liver damage.

Tromexan is a derivative of dicoumarol. It is less toxic, more rapidly metabolised and excreted. It can be given, and its action is enhanced and prolonged, in the presence of liver damage. Dose 1,200 milligrams daily, to commence with, and then reduced to 300 to 600 milligrams daily.

Its action commences in 2 to 3 hours

administration and reaches its peak in 12 to 24 hours.

Sodium and Potassium citrates are used in blood transfusion to prevent the blood from clotting. They combine with the calcium salts present in the blood, forming inactive compounds. Sodium citrate 3.8 per cent. solution is commonly employed.

Sodium oxalate is used for collecting blood for the various blood tests.



CHAPTER V

DRUGS WHICH INFLUENCE METABOLISM

Thyroideum.—Thyroid, an extract obtained from the thyroid gland. The internal secretion of the gland is thyroxin, which stimulates the metabolic rate, its secretion being controlled by the pituitary gland.

Thyroid extract is given in the treatment of cretinism, a condition occurring in a child who has a deficiency of the secretion; and in myxœdema, a condition in which the thyroid gland is under-active in the adult. It is also given in the treatment of obesity.

Liquor iodi aquosus, or **Lugol's iodine**, is given to people suffering from hyperthyroidism. The dose is 5 to 15 minims, and it is usually given in milk. It is given before and after operation, and helps to lessen the basal metabolic rate, reduce nervous symptoms, and increase weight. In the condition of acute thyroidism occurring after operation it is given to the patient intravenously.

Thiouracil is a drug related to the sulphonamides. It prevents the formation of thyroxine by inhibiting the uptake of iodine by the thyroid and controls the signs and symptoms of thyrotoxicosis. It produces a reduction in the basal metabolic rate, causing it to reach a normal level, a decrease in the pulse rate, and in the condition of auricular fibrillation the normal rhythm of the pulse may be restored. In some cases patients may resume normal activity 4 weeks after commencing treatment. It is a valuable drug in the preparation of a patient for operation.

Dose 0.6 gramme daily for 3 weeks. 0.2 gramme daily maintenance dose.

Toxic effects: the most serious effect of the drug is that it may produce agranulocytosis. Other toxic

symptoms may be fever, urticarial rashes, enlargement of the lymph glands and spleen and the thyroid. Because of these toxic effects the patient must be kept under regular medical supervision and the white blood count should be estimated daily or every few days.

Radio iodine has been used in the treatment of hyperthyroidism and cancer of the thyroid. The substance is stored in the thyroid and the radioactivity emitted inhibits the functional activity of the gland and controls the growth of malignant tissue.

Extractum parathyroidei (parathormone).—This is a preparation obtained from the parathyroid glands of sheep, ox, and other animals. It is given by injection and it has the effect of raising calcium concentration in the blood. Additional calcium must be given in the food because otherwise the increase in calcium will be obtained only from the bones. It is used to relieve the convulsions of tetany.

Insulin is obtained from the internal secretory cells of the pancreas from the islets of Langerhans. It is given by subcutaneous injection and is obtained in tablet or solution form. It must be given by injection, because when it is given by mouth it is destroyed by the action of pepsin and trypsin. It enables the tissues to metabolise sugar by increasing the glycogenic function of the liver.

It is used in the treatment of diabetes mellitus when a patient has a low carbohydrate tolerance and it is also given in the treatment of diabetic coma. Diabetic coma results from the incomplete oxidation of fats, which produces ketone bodies. Insulin is given with or without glucose until the urine is free from sugar.

Types of Insulin Used.

Soluble insulin. This is a clear solution produced with a rapid action and reducing the blood sugar within a few minutes of injection and attaining maximum

effect in a few hours. In order to maintain normal blood sugar it must be injected 2 to 3 times a day.

Protamine insulin is a compound containing insulin with protamine obtained from trout sperm. It has prolonged action.

Zinc protamine insulin contains zinc. It retards the action of insulin and its action lasts for 24 to 30 hours. It causes a gradual fall in the blood sugar and permits of the dosage being given less often. One injection is given daily before breakfast. Sometimes an injection of soluble insulin is given at the same time to cover the period immediately following the meal. The chief disadvantage of zinc protamine insulin is that an evening dose may cause dangerous hypoglycæmia in the night fasting period.

Globin insulin has properties intermediate between soluble and zinc protamine insulin. Its effect on the blood sugar begins within an hour of the injection, reaching the maximum in 8 hours and disappearing in 12 hours. If it is to be substituted for zinc protamine insulin more carbohydrate should be given early in the day. It should not be used alone for patients with severe diabetes, because it does not counteract the steady increase of blood sugar which occurs after midnight. It is of value for patients with a normal fasting blood sugar and sugar-free urine at the beginning of the day, and for the older patient where the total daily dose of insulin does not exceed 40 units.

Concentrations of Insulin Supplied.

Soluble insulin is made up in different concentrations containing so many units in 1 c.c. It is a clear solution and should be kept in a cool dark place.

Zinc protamine and globin insulin are supplied only in double and quadruple strengths—*i.e.*, 40 units in 1 c.c. and 80 units in 1 c.c. Zinc protamine insulin is an aqueous suspension and should be shaken before

use. The globin insulin is a clear fluid and needs to be shaken before use.

In measuring the dose of insulin a special syringe should be used in which the c.c. is divided into 20 divisions and care must be taken in its accurate measurement. Soluble insulin and zinc protargol insulin may be given at the same time with the same syringe, drawing up the soluble insulin first into the syringe.

Suprarenal Gland.

Adrenaline, or **epinephrine**, is obtained from the medulla of the suprarenal gland. It may also be prepared synthetically.

The preparation commonly used is **liquor adrena-
hydrochloridi**, 1 in 1,000 solution. *Injectio Adrenalinae*, dose 2-8 min. Adrenaline must be given by injection because it is destroyed by the action of gastric juice when given by mouth. It raises the blood pressure and stimulates all secretions. It liberates glycogen from the liver for muscular action, and is sometimes given in the treatment of patients in insulin coma.

Cortin is the active principle of the cortex of the suprarenal gland. Its work in the body is to maintain the concentration of sodium chloride in the blood. It is given in the preparations of **cortin** and **eucortin** with sodium chloride in the treatment of Addison's disease. It is given either intravenously or intramuscularly, the dose being regulated by the patient's weight and condition.

Desoxycorticosterone acetate, **D.O.C.A.**, "**Cortone**," is a synthetic crystalline substance having the same biological action as cortin. It is given by subcutaneous implantation or injection, or by intramuscular injection, in the treatment of patients suffering from Addison's disease. It

also given in the treatment of toxæmia resulting from burns.

Cortisone (Compound E) is a crystalline hormone substance isolated from extracts of the adrenal cortex. Conditions which have responded to its use are acute lupus erythematosus, certain eczematous conditions and eye conditions. It has been highly effective in controlling Addison's disease in conjunction with D.O.C.A.

It is of particular value in the treatment of patients suffering from rheumatoid arthritis, which is believed to be due to an abnormality of one of the constituents of the cortex of the adrenal gland. It is also used for the treatment of patients with acute rheumatism.

Anterior pituitary hormone A.C.T.H. (adrenocortico-tropic hormone), whose chief function is to stimulate the adrenal cortex to produce compound E, will produce the same beneficial results.

Pituitary Gland.

The anterior lobe produces hormones which influence the following:

- (a) Growth.
- (b) The production of œstrone (Prolan A).
- (c) The formation of corpus luteum secretion, or progesterone. Preparations from this have been used in the treatment of amenorrhœa. Anterior lobe preparations have been used in the treatment of obesity and acromegaly (Prolan B).

The posterior lobe produces **pituitrin**, which contains two principles:

- (i) **Vaso-pressin**, or **pitressin**. This causes contraction of arterioles and raises the blood pressure. It contracts the involuntary muscles of the intestine and the bladder, and is given to relieve distension.

It is given as a specific remedy in the treatment of

diabetes insipidus, to check the excessive secretion of urine.

(ii) **Oxytocin**, or **pitocin**, which stimulates the contraction of uterine muscle.

Vitamins.

Vitamins are chemical substances present in food and are spoken of as accessory food factors. They provide protection against infection and disease. Many of these vitamins have now been isolated and are produced in synthetic preparations.

Vitamin A is present in the fatty tissue of animals and is found in milk, cream, butter, meat fat and fish-liver oil. It is present also in green vegetables and in the bones of fish, birds and animals.

Carotene, the precursor of vitamin A, is present in carrots, peaches, apricots, oranges, tomatoes and green vegetables. Carotene is turned into vitamin A in the body and is stored in the liver.

Vitamin A is the growth-producing vitamin and is anti-infective, providing protection against infection by maintaining the resistance of the mucous membrane to infection. A partial deficiency produces night blindness and a deficiency causes xerophthalmia, a disease affecting the conjunctiva and the cornea.

Official preparations containing vitamin A are:

Liquor vitamini A concentratus.—Concentrated solution of vitamin A. Dose 1 to 10 minims.

Oleum hypoglossi.—Halibut liver oil. Dose 1 to 10 minims.

Proprietary preparations are:

Avoleum.

Essogen.

Carotene tablets.

Vitamin D.—The antirachitic factor, deficiency of which gives rise to rickets. Vitamin D increases the absorption of calcium and phosphorus from the intestine, thus increasing the calcium and the phosphorus content of the blood and increasing calcification of bone. It is formed in the body by the action of sunlight or ultra-violet light.

Official preparation, **Liquor calciferolis**. Dose 5 to 20 minims for prophylaxis daily; 10-100 minims for therapeutic effect daily.

Liquor vitamini D concentratus.

Proprietary preparations are:

Radiostol.

Viosterol.

Ostelin.

Preparations containing vitamins A and D:

Liquor Vitaminorum A et D concentratus, dose 1 to 10 minims.

Proprietary preparations are:

Adexolin and cod-liver oil.

Halibut liver oil.

Oleum morrhuæ (Cod-liver oil).

Preparations:

Cod-liver emulsion (**Emulsio olei morrhuæ**). Dose 90 to 180 minims.

Extract of malt with cod-liver oil (**Extractum malti cum oleo morrhuæ**). Dose 60 to 240 minims.

Cod-liver oil is given externally by inunction, and is used as a nutrient in marasmus. It is also applied locally for the treatment of burns and wounds because the vitamin appears to hasten epithelial growth. It is given by mouth as a prophylactic measure and in the treatment of diseases due to a deficiency of vitamins A and D. It is also used in conditions of malnutrition and respiratory infections.

Vitamin B is a complex vitamin consisting of many

factors. These factors control normal growth, appetite, tissue oxidation, carbohydrate metabolism and nutrition of nerve tissue.

Vitamin B₁, or Aneurine (Thiamine chloride).—Antineuritic factor. Deficiency produces beriberi. It is also used in the treatment of other forms of peripheral neuritis.

Official preparations:

Vitamin B powder (Pulvis vitamini B₁).

Aneurine hydrochloride (Aneurinæ hydrochloridum).

Proprietary preparations are Betaxan and Benec.

It is also contained in marmite, a yeast extract and in bemax.

Vitamin B₂, or Riboflavin (Lactoflavin), is present in yeast, milk, whey, liver extract and eggs.

Vitamin PP, or Nicotinic acid, is a preventive against pellagra. It is present in meat.

Other vitamin B factors are as follows:

Pyridoxin (B₆) plays some part in maintaining health of the skin.

Pantothenic acid.

Biotin, which is present in raw egg white.

Pteroylglutamic acid (Folic acid).—This is a recently identified constituent of the vitamin group. It occurs naturally in yeast, liver, kidney, milk, grasses and green leaves. When given in the treatment of pernicious anæmia it produces a reticulocytosis but has no curative effect on the central nervous system complications.

Vitamin B₁₂ is a red crystalline material isolated from the liver. It can also be produced as effectively by *Streptomyces griseus*. It is thought that it may be closely related to the anti-pernicious anæmia principle of the liver and that the function of the intrinsic factor is to facilitate absorption of vitamin B₁₂ by the intestine. Vitamin B₁₂ stimulates growth in young animals and improves the blood.

picture in pernicious anæmia. It is also effective in the neurological symptoms of pernicious anæmia. It is given by intramuscular injection.

Vitamin C (Ascorbic acid), the antiscorbutic factor.

A lack of this vitamin impairs the formation of red cells, increases the fragility of capillaries, lowers resistance to infection and causes scurvy.

Ascorbic acid is given by mouth or by intravenous or intramuscular injection. It is used in the treatment of capillary hæmorrhage and in dermatitis.

Multivite is a preparation containing vitamins A, B, C and D.

Vitamin P, or Hesperidin, is claimed by some to control permeability of capillaries and is found in association with vitamin C.

Vitamin E (α -Tocopheryl acetate).

This is present in wheat-germ oil and in lettuce. It exerts an action on reproduction and is given in pregnancy to prevent abortion. It also exerts some effect in neuro-muscular diseases.

Proprietary preparations are:

Viteolin	} Wheat-germ preparations which are
Fertiloil	
Phytoferol	
Ephynal	supplied in tablet form.

Tocopherol is a synthetic preparation.

Vitamin K, a fat-soluble factor obtained from the green part of various plants and from liver. It is essential for the formation of prothrombin. It is given in cases of excessive hæmorrhage due to a deficiency of prothrombin. In cases of obstructive jaundice it is given before and after operation to prevent hæmorrhage. It is also given to pregnant women and to treat the condition of melæna neonatorum. Bile helps in the absorption of vitamin K, and may be administered with it.

Kapilon, a synthetic preparation, is given in injection and orally.

Official preparation, **Menophthonum**, given in intramuscular injection.



FIG. 3.—MEADOW SAFFRON (COLCHICUM).

Drugs used in the Treatment of Obesity.

Dexedrine (dextro-amphetamine).—This drug increases the appetite and increases activity and in this way helps in the treatment of obesity.

Dose 5 to 30 mg. daily taken half to one hour before meals in divided doses.

Drugs given for the Treatment of Gout.

Cinchophenum, or **atophan**.

Dose 5 to 10 gr. by mouth.

This drug increases the secretion of uric acid. It is given to obviate attacks of gout. Glucose and calcium are given in large doses with it, because it is liable to cause damage to the liver. Fluids are also given freely, and sodium bicarbonate, to prevent the formation of urinary stones.

Colchicum is given as a specific remedy for relieving pain and inflammation in gout.

CHAPTER VI

DRUGS WHICH AFFECT THE RESPIRATORY SYSTEM

DRUGS affecting the respiratory system will be divided into:

- Expectorants.
- Drugs which diminish secretion.
- Respiratory sedatives.
- Antispasmodics.
- Antiseptics.
- Respiratory stimulants.

Expectorants.

An expectorant is a drug which is given to increase and liquefy the secretion of the bronchial mucous membrane. Some act directly on the bronchial tubes, and others may act reflexly by stimulation of the sensory nerve endings in the stomach. The chief of the expectorants in use are:

Ipecacuanha, obtained from the roots of the ipecacuanha plant. It produces increased expectoration by its reflex action on the vagal centre through irritation of the sensory nerves in the stomach. It is used in the treatment of patients suffering from acute and chronic bronchitis, and it



FIG. 4.—IPECACUANHA.
Plant and root.

is also used in croup and whooping-cough, because it is well tolerated by children.

Preparations in use are:

Tinctura ipecacuanhæ. Dose 10 to 30 minims.

Ammonium, a reflex expectorant, is included in many cough mixtures.

Preparations used are: *Ammonium carbonate*, *bicarbonate*, *liquor ammonii acetatis*.



FIG. 5.—SCILLA.

Squill, or **scilla**, obtained from the scilla bulb, has an irritant action and acts reflexly. It has the same action on the heart as *digitalis*.

Preparations of squill:

Syrup of squill (*Syrupus scillæ*). Dose $\frac{1}{2}$ to 1 fl. dr.

Oxymel of squill (*Oxymel scillæ*). Dose $\frac{1}{2}$ to 1 drachm.

Tincture of squill (*Tinctura scillæ*). Dose 5 to 30 minims.

Senega, obtained from the senega root.

Tincture of senega (*tinctura senegæ*). Dose $\frac{1}{2}$ to 1 drachm.

Infusion of senega (*Infusum senegæ recens*). Dose $\frac{1}{2}$ to 1 ounce.

Camphor, used in the treatment of coughs and bronchitis, catarrh.

Tinctura opii camphorata (paregoric) contains camphor 0.3 per cent., opium 5 per cent., with benzoic acid and oil of anise in alcohol 60 per cent.

Dose 30 to 60 minims. 60 minims contains $\frac{1}{37}$ grain of morphine.

Iodides :

Potassium Iodide.—This drug stimulates the

secretion of the bronchial tubes during its excretion. It is often combined with ammonium carbonate.

Benzoin.—Inhalation of the vapour causes an increased stimulation of the secretion from the mucous membrane.

Preparation commonly in use is:

Friar's balsam, or *Tinctura benzoini composita*.

Balsam of Tolu.

This is given in syrup form, and acts as a mild reflex expectorant.

Drugs which Diminish Secretion.

Atropine paralyses the secretory nerve endings and checks bronchial mucous secretion, and is given by injection to patients before operation when ether anæsthesia is given. It is also given to patients suffering from phthisis to check the night sweats. For this purpose the Dry Extract of Belladonna in pilular form is given.

Respiratory Sedatives.

Respiratory sedatives are drugs which cause the cough reflex to be depressed and coughing to be diminished. They are sometimes combined with expectorants. The chief drugs used are:

Morphine.

Diamorphine.

Codeine.

Cocaine.

Prussic acid.

Morphine and **opium** are sometimes prescribed in small doses with expectorants to relieve severe pain. Morphine is given in attacks of hæmoptysis. It quietens the patient and reduces coughing.

Tinctura opii camphorata (Paregoric) contains

camphor 0.3 per cent., opium 5 per cent., benzoic acid and oil of anise in alcohol 60 per cent.

Diamorphine hydrochloride, or **heroin**, is a derivative of morphia derived by acetylation. It is given as a sedative in conditions of irritating cough in the form of linctus heroin; this also contains glycerine and syrup of Virginian prune. It is given by mouth, the dose being 1 drachm.

Codeine, an alkaloid of opium and derivative of morphia. It depresses the cough reflex, and is given in the form of a linctus.

Cocaine is sometimes used in spray form to relieve an irritating and painful cough.

Virginian prune (Syrup of Virginian prune, Symplicia of wild cherry) has a sedative effect owing to its *prussic acid* content. It is useful in the treatment of an irritable cough occurring in bronchitis and pharyngitis.

Taoryl is given in tablet form to relieve cough.

Antispasmodics.

Antispasmodics are drugs given to relax spasmodic bronchial muscle in asthma. They include:

Adrenaline.

Ephedrine.

Stramonium.

Nitrites.

Adrenaline, or **Epinephrine**, prepared from suprarenal glands. It causes dilatation of bronchioles, and is given to relieve spasmodic asthma.

Dose 2 to 10 minims of 1 in 1,000 solution, given by hypodermic injection. It is a dangerous drug if given in an overdose, though large total amounts are sometimes given by slow injection (1 minim per minute) in severe cases of asthma.

Neo-epinephrine is a derivative of adrenaline. It is given to avoid the cardiovascular side effects of the parent drug.

drug and can be given orally for the relief of asthma, bronchitis and allied conditions. Dose 10 to 20 mg. sublingually. One per cent. solution if given by oral inhalation.

Neodrenal is also used, given in tablet form and by oral inhalation.

Ephedrine, obtained from a Chinese plant, has a similar effect to adrenaline, but can be given by mouth and is more lasting. It is usually given in daily doses to the patients, whereas adrenaline is given during an actual attack.

Ephedrine hydrochloride. Dose $\frac{1}{4}$ to $1\frac{1}{2}$ gr., given by mouth.

Stramonium, obtained from stramonium leaves, contains hyoscyamine, atropine and hyoscine. By paralysing the vagus terminations in the bronchi it relaxes the muscle. It is used in the treatment of whooping-cough and asthma, and is given by mouth in the form of tincture.

Nitrites :

Amyl nitrite. Dose 2 to 5 minims by inhalation.

This is given to relieve attacks of asthma because of its action in relaxing the muscle. It is also used in small doses to arrest spasms in whooping-cough.

Trinitrin tablets given by mouth have the same effect.

Pulmonary Antiseptics.

Pulmonary antiseptics are drugs which act as disinfectants or germicides. They may be given by mouth or by inhalation. When given by mouth, they are said to be excreted into the respiratory tract and exert their antiseptic effect in excretion. When inhaled, they act locally on the bronchial mucosa and in the lungs.

Creosote.—This drug is used in the treatment of bronchiectasis and pulmonary tuberculosis. It acts as a deodorant and antiseptic. It may be given by

mouth in capsule form or by inhalation. When inhaled it may be given in the form of a steam inhalation, or a few drops of creosote may be placed on a piece of lint and given by means of a Burney Yeo's machine.

Benzoin, obtained from a Peruvian tree, has slight antiseptic effect and is given in the form of Tinct. Benzoin. Co. (**Friar's Balsam**) as a steam inhalation, using 1 drachm to a pint of water.

Oil of Pine is both stimulating and antiseptic in effect. It is given as a steam inhalation, using 1 drachm to a pint of water.

Penicillin inhalations are given in respiratory infections.

Stimulants of the Respiratory System.

Respiratory stimulants are given to patients chiefly suffering from respiratory failure as the result of poisoning from morphia, alcohol, and during anæsthesia. The chief drugs used are:

Strychnine.	Ammonia.
Camphor.	Caffeine.
Leptazol.	Lobelia.
Nikethamide.	Carbon dioxide.
Picrotoxin.	

Strychnine.—This is used in the treatment of respiratory illnesses as bronchitis, to increase the cough and respiratory movements. It is combined with expectorants. It is also given to treat respiratory failure resulting from poisoning from morphia, or collapse during anæsthesia. Dose $\frac{1}{32}$ to $\frac{1}{8}$ gr.

Camphor is obtained from an evergreen growing in China and Japan; it is also prepared synthetically. It is given as a respiratory stimulant in cases of collapse. It is prepared in oil, and is given to the patient by means of an injection given deep intramuscularly.

Leptazol (Cardiazol or Metrazol) is a synthetic compound pentamethylene-tetrazol. Its action and usefulness resemble those of camphor.

Nikethamide or **Coramine**.—This is a direct stimulant to the respiratory centre, and is given in respiratory failure and in poisoning from opium and general anæsthetics.

Injectio Nikethamidi, dose 15 to 60 minims, by intravenous or hypodermic injection.

Picrotoxin stimulates the respiratory centre in the medulla and is useful in barbiturate poisoning and to control barbiturate anæsthesia.

Ammonia.—This is used, for its general reflex stimulating effect upon the respiratory centre, in attacks of fainting and collapse and asphyxia.

Preparation commonly used is:

Spiritus ammoniæ aromaticus or sal volatile. Dose 1 drachm.

Caffeine, which is obtained from the dried leaves of the tea or coffee plant. It is used as a respiratory stimulant in poisoning from morphia and alcohol. Dose 5-10 gr.

Caffeine sodium benzoate. Dose 5 to 15 gr. by mouth; 2 to 5 gr. by subcutaneous injection.

Lobelia, obtained from the dried flowering herb.

Lobeline hydrochloride, an alkaloid of lobelia. Dose $\frac{1}{20}$ to $\frac{1}{8}$ gr.

Tinctura lobeliæ ætheræ. Dose 5 to 15 minims.

Carbon dioxide gas stimulates the respiratory centre and causes an increase in the depth of respiration. It is usually combined with oxygen in a mixture of 5 per cent. carbon dioxide and 95 per cent. oxygen.

CHAPTER VII

DRUGS AFFECTING THE GENITO-URINARY SYSTEM

DIURETICS

DIURETICS are drugs which increase the flow of urine.

They produce this effect by:

1. Increasing the force of the heart's action and the pressure of blood through the kidney.
2. Dilating renal vessels.
3. By alteration of osmosis in the renal tubules.
4. By irritation of the renal cells during excretion.

1. *Drugs which increase the force of the heart's contraction and the pressure of blood through the kidneys.*

Digitalis, obtained from foxglove, increases the flow of urine by its effect on the circulation, but in excessive doses and in patients suffering from the cumulative effect the urine will be decreased in amount. It is only a diuretic in cases of cardiac oedema.

Strophanthus.—Tincture of strophanthus has a similar use to tincture of digitalis, but is not as effective.

Squill is used in conditions of cardiac dropsy. It is usually given combined with digitalis and mercury as Guy's pill.

2. *Drugs which dilate the renal vessels.*

Caffeine dilates the renal vessels and increases the amount of water and solid substances in the urine. It is given in cardiac disease sometimes, combined with digitalis.

Preparations used:

Caffeine. Dose 5 to 10 gr.

Caffeine citrate. Dose 2 to 10 gr.

Caffeine sodium benzoate. Dose by mouth 15 gr.; by injection 2 to 5 gr.

Theobromine dilates the renal vessels and increases the flow of urine.

Preparations used:

Theobromine and sodium salicyl ("diuretic"). This is used in cardiac œdema and in Bright's disease.

Theobromine with phenobarbitone, "Theomin."

Theophylline is a similar preparation to theobromine, but it is a more powerful diuretic.

Theophylline with ethylene diamine is **Aminophylline** ("Euphyllin").

Aminophylline.—This is one of the most effective diuretics and causes no gastric or renal irritation. It can be given by mouth or by injection and is useful in reducing œdema in diseases of the kidney and heart.

Dose 0.1 gramme ($1\frac{1}{2}$ -8 gr.) by mouth; 0.1 gramme by intramuscular or intravenous injection.

3. *Diuretics which act by altering osmosis in the tubules of the kidney.*

The **saline diuretics** are the chief of these. They raise osmotic pressure and fluid is drawn from the tissues to adjust the balance. They are rapidly absorbed by the plasma and are excreted by the kidneys; thus the urinary water is very much increased and the tissue fluids reduced.

Potassium citrate and **potassium acetate** are the chief substances used.

Urea and **ammonium acetate** (liquor ammoniac acetatis) are other substances which are not absorbed by the tubules and which raise osmotic pressure and prevent the normal reabsorption of water.

Urea, a diuretic, is also used in testing renal efficiency.

4. *Drugs which cause irritation of the renal cells.*

Mercurial preparations:

Mersalyl (mersalylum), an organic compound of mercury given by intramuscular injection. It is a valuable diuretic in cardiac and renal œdema, particularly in cardiac failure and chronic nephritis when there is persistent œdema but no impairment of renal function. It should not be given in cases of hæmaturia and albuminuria.

Injectio mersalyli, which contains mersalylum 10 per cent., with theophylline 5 per cent.

Other proprietary preparations include:

Salyrgan.

Novurit.

Neptal.

Esidrone.

The administration of ammonium chloride in doses of up to 60 gr. daily enhances the action of these drugs.

Both salyrgan and novurit may be given in suppository form, after preparation with an enema or an aperient.

The toxic effects are dyspnœa, renal irritation, cardiac disturbances and allergic reactions.

Turpentine causes irritation of the renal cells and acts both as a diuretic and an antiseptic; it must not be used in cases of nephritis.

URINARY ANTISEPTICS

Urinary antiseptics are given to treat inflammatory conditions of the urinary tract. They take effect by:

1. Making the urine acid.
2. Rendering the urine alkaline.

3. Liberating an antiseptic in the urine.
4. Having specific effect.

1. Drugs given to make the Urine Acid.

Acid Sodium Phosphate.—This is the normal salt in urine, and when given it increases the acidity of urine. It is used in certain conditions of cystitis and pyelitis.

Ammonium Chloride.—Ammonium chloride is converted to urea, and is used in conjunction with mandelic acid in the treatment of *B. coli* cystitis. It is also given with mercurial diuretics, as it enhances their effect.

Boric Acid is slowly excreted by the kidney, and is given as a urinary antiseptic in both acid and alkaline urines.

Benzoic Acid is converted in the kidneys to hippuric acid, and as such is excreted, acting as a diuretic and urinary antiseptic. It is used in the treatment of cystitis in an alkaline urine.

Sodium Benzoate is used as a urinary antiseptic.

2. Drugs which make the Urine Alkaline.

The chief drugs which inhibit the growth of *B. coli* are the citrates and acetates of potassium and sodium bicarbonates. The most commonly used is **potassium citrate**, which is given in repeated doses of 15 to 30 gr.

Sometimes this drug is combined with **hyoscyamine**, the hyoscyamine being added for its sedative effect. It is given in the treatment of pyelitis and cystitis.

3. Drugs which Liberate Antiseptics.

Hexamine, or Urotropine. Dose 10 to 30 gr.

In the presence of an acid urine, hexamine becomes decomposed to formaldehyde and ammonia, and

such it is excreted by the kidney, exerting in its excretion both an antiseptic and diuretic effect. To ensure acidity of urine it is given in conjunction with acid sodium phosphate or ammonium chloride. These drugs are given 1 or 2 hours previous to the hexamine.

Mandelic Acid.—This drug is given in the treatment of coliform infection. Again it is essential that the urine be acid, and to ensure this ammonium chloride is given in doses of 15 gr. repeatedly.

The drug is given as **calcium, sodium or ammonium mandelate** in doses of 50 gr. four times daily.

When ammonium mandelate is given, the ammonia is converted into urea and mandelic acid is liberated.

Special tests of urine must be made to ensure the right degree of acidity. Test: 2 c.c. of urine are put into a test tube and 5 drops of methyl red are added. A slightly pink colour will show that the urine is of the correct acidity. If too acid, the colour will be deep pink; if too alkaline, it will be yellow.

The amount of fluid given to the patient is limited to about 2 pints a day, in order to obtain the concentration of mandelic acid in the urine.

Proprietary preparations containing ammonium mandelate are ammoket and neoket.

Buchu.—Obtained from buchu leaves.

Infusum Buchu, 1-2 fl. oz. Dose 5 to 20 minims.

This is a diuretic and mild urinary antiseptic, owing to its volatile oil, which stimulates the renal cells. It is used in conjunction with other diuretics.

4. Drugs which have Specific Effect.

The sulphonamides are much used now as anti-septics in the treatment of pyelitis and cystitis.

Sulphapyridine and **urolucosil** are found to be effective generally in treating urinary infections,

and **gantrisin** is particularly effective in these infections. When sulphonamides are given the fluid intake of the patient should be liberal and the urine should be made alkaline by giving a mixture of sodium citrate and sodium bicarbonate. This prevents the occurrence of hæmaturia and calculi which result from the deposition of crystals in the ureters or kidneys.

Drugs given to Relieve Retention of Urine:

Carbachol ("Doryl"), a choline derivative, is given by mouth or by injection. 0.25 mg. is given by injection to cause contraction of the muscles of the bladder.

Drugs Influencing the Reproductive System

These may be divided into:

1. Uterine stimulants.
2. Uterine sedatives.

1. **Uterine Stimulants.**—The drugs which stimulate the uterus include:

Ergot.
Pituitrin.
Quinine.

Ergot is obtained from the rye fungus. Its active principles are:

Ergometrine.
Ergotoxine.
Ergotamine.
Tyramine.

Ergot acts upon the unstriated muscle of the pregnant uterus, and is used in securing and maintaining contraction in an atonic uterus. It is also given to check bleeding in menorrhagia, metrorrhagia and in post-partum hæmorrhage, and to expel retained products.

Preparations in use include:

Liquid extract of ergot. Dose 10 to 20 minims.

Ergometrine. Dose 1 mg. by mouth; or 0.125 mg. intravenously; 0.25-0.5 mg. intramuscularly.

Ergotoxin æthanesulphonate.

Ergotamine tartrate. Dose $\frac{1}{120}$ to $\frac{1}{60}$ gr.

"**Femergin**" is a proprietary preparation of ergotamine tartrate containing the active principles of ergot. It is given in tablet or ampoule form by mouth or by injection. It is of value in the treatment of migraine.

Pituitrin is an extract obtained from the posterior lobe of the pituitary gland. It contains two active principles: pitressin and oxytocin or pitocin.

Oxytocin (pitocin) increases the contraction of the uterus, and is used to accelerate labour and to check uterine bleeding. Dose 0.5 to 1 c.c. by hypodermic injection.

Quinine is used to augment weak contractions of the uterus during the first stage of labour.

2. Uterine Sedatives.—These are given to relieve painful menstruation, taking the form of such drugs as aspirin, phenacetin and others.

Other drugs are given in the treatment of habitual and threatened abortion, and include:

Corpus luteum hormone.

Vitamin E.

Progestin, or **progesterone**, is the hormone secreted by the corpus luteum. Its secretion is stimulated by prolactin B of the anterior lobe of the pituitary gland. It is given by intramuscular or hypodermic injection in the treatment of habitual abortion, because it has a quiescent effect upon the pregnant uterus. It is also given in the treatment of cases of threatened abortion. There are many proprietary preparations containing progestin.

Stilboestrol is a synthetic oestrogenic substance is used in menopausal disturbances and disorders of menstruation. It is also used in the treatment of chronic mastitis. It has proved effective in carcinoma of the prostate gland. Dose 0.5 to 2 mg. by mouth.

Dienoestrol is a similar preparation.

Vitamin E.—Wheat-germ oil and lettuce are potent sources of vitamin E. The vitamin E in wheat-germ oil has been identified as α -tocopherol and this substance has been produced synthetically as vitamin E preparation or **ephynal**. It is also obtained in concentrated capsule form as **phytoferol** and **viteolin**.

Vitamin E preparation is given daily to pregnant women who previously have had abortion or in cases of threatened abortion.

Testosterone, the male sex hormone, is given by injection or by mouth. It is used in some cases of carcinoma of the breast with widespread metastases.

CHAPTER VIII

DRUGS AFFECTING THE NERVOUS SYSTEM

DRUGS used in connection with the nervous system will be divided into the following groups:

1. Stimulants of the nervous system.
2. Depressants of the nervous system.
3. Anæsthetics.
4. Drugs producing relaxation of muscle.
5. Stimulants of the parasympathetic system.
6. Depressants of the parasympathetic system.

STIMULANTS OF THE NERVOUS SYSTEM

The drugs which bring about stimulation of the nervous system are strychnine and caffeine.

Strychnine.

This is the active principle of **nux vomica**, which is obtained from the fruit of the nux vomica tree. It is a stimulant of the central nervous system. It affects chiefly the spinal cord. It is given as a tonic, improving the function and the tone of the voluntary and involuntary muscles. It is also given in the treatment of paralysis, in diphtheria and lead poisoning.

Preparations in use:

Strychnine hydrochloride.

Dose $\frac{1}{32}$ to $\frac{1}{8}$ gr.

Liquor strychninæ hydrochloridi. Dose 3 to 12 minims.

Syrupus ferri phosphatis cum quinina et strychnina, or Easton's syrup, containing $\frac{1}{60}$ gr. strychnine in 60 minims. Dose 30 to 60 minims.

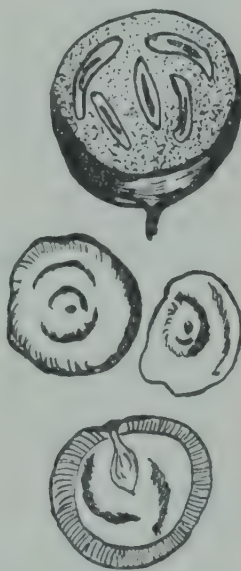


FIG. 6.—NUX VOMICA SEEDS.

Caffeine.

This is an alkaloid obtained from the dried leaves of the tea or coffee plant. Caffeine is a stimulant of the central nervous system, and relieves mental and muscular fatigue and increases the action of almost every organ of the body. The person taking it becomes more alert, and sensations are keener. It also stimulates respiration. It is frequently combined with aspirin and phenacetin for the relief of nervous headache, migraine and neuralgia. It is used also as a respiratory and heart stimulant, and as stimulant in cases of poisoning from narcotics.

Preparations in use:

Caffeine dose 5 to 10 gr.

Caffeine and sodium benzoate is given by hypodermic injection 2 to 5 gr.

Caffeine and phenacetin tablets, 5 gr. contain 1 gr. caffeine and 4 gr. phenacetin.

Amphetamine (Benzedrine).**Amphetamine sulphate (Benzedrine sulphate).**

This is a synthetic preparation similar to adrenaline and ephedrine. It causes increased mental activity and induces restlessness and insomnia, talkativeness and increased physical activity. It is also given to relieve states of mental depression, and it is of value in averting sleep in narcolepsy and in the treatment of post-encephalitic Parkinsonism. Dose $\frac{1}{2}$ to $\frac{1}{6}$ gr. given by mouth.

Similar preparations are Dexedrine and Metedrine.

Picrotoxin is a compound obtained from the seeds of the *Cocculus indicus*. It is a stimulant of the central nervous system and is used chiefly in cases of poisoning by the barbiturates and after thiopental anaesthesia.

DEPRESSANTS OF THE NERVOUS SYSTEM

Depressants may be divided into:

Hypnotics and sedatives.

Narcotics.

Analgesics.

Hypnotics and Sedatives.

Hypnotics are drugs which produce a natural sleep. They depress the perceptive centres and in larger doses the sensory and motor areas.

Bromides are salts formed by the combination of an alkali with hydrobromic acid. They lessen the activity of the entire nervous system and decrease nervousness and emotional excitability.

Potassium and sodium bromide. Dose 5 to 30 gr. Bromide is given as a sedative in conditions of worry and mental strain producing sleeplessness. It is also given in the treatment of epilepsy and has the effect of lessening the frequency of convulsions. Continued ingestion of bromide leads to chronic bromide intoxication.

Brometone is an organic bromide salt given in tablet form for the treatment of epilepsy and sea sickness.

"Sedobrol" is a preparation of sodium bromide. It is produced in a cube form combined with vegetable extracts. It is given dissolved in hot water as a cathartic. One cube contains 17 gr. sodium bromide.

Chloral hydrate is formed by the combination of chlorine gas and an alcohol. Dose 5 to 30 gr.

It is a very powerful hypnotic. It depresses the perceptive centres of the cerebrum and produces in a short time a natural and refreshing sleep of long duration. It is given in conditions of mental anxiety and excitement, and is often combined with bromide. It is also given in convulsions. Chloral is liable to produce a drug habit when used often.

Syrup of chloral is sometimes given to children.
Dose $\frac{1}{2}$ to 1 drachm.

Paraldehyde is an oxidation product of alcohol. It has a characteristic taste and smell. Dose 120 minims by mouth; 120 to 240 minims per rectum.

This drug is rapidly absorbed and induces sleep in a short time. It has an unpleasant taste and is excreted by the expired air, the breath retaining an unpleasant odour for some time. The unpleasant taste may be disguised by giving it in orange juice, syrup, or in brandy or gin. It may be given per rectum.

It is given in conditions like pneumonia, where it is essential to produce sleep by giving a drug which will have no depressing effect upon the heart or the circulation. It is also used in mental cases. In cases of excitability paraldehyde may be given by intramuscular injection in doses of 5 to 7 c.c.

Urea.

Carbromal ("Adalin") is a derivative of urea and is a useful hypnotic for children. It is a powerful hypnotic, acts very quickly and produces no after-effect. Dose 5 to 15 gr.

The Sulphonal Group.

The sulphonal drugs act more slowly and are less effective than others. There is also a danger of cumulation which makes them unsatisfactory.

Sulphonal. Dose 5 to 20 gr.

This drug takes some time to take effect, but produces no after-effect and is very lasting in result, the drowsiness persisting during the next day. It has no depressant effect upon the heart.

Methyl sulphonal, "**Trional**," is a more powerful hypnotic than sulphonal. It acts more rapidly and the sleep produced lasts 8 to 10 hours.

These two drugs are best given in hot milk before bedtime.

The Barbiturate Group.

The barbiturates are derivatives of barbituric acid and are the most commonly used hypnotics. Barbituric acid is a powerful hypnotic, producing sleep in a very short time. The powders and tablets are best dissolved in milk and given about 15 minutes before bedtime.

Amytal.

Amytal Sodium.--A compound of barbitone, and given as a hypnotic and sedative. It is used as premedication before anæsthesia. Dose 1 to 3 gr.

Allobarbitonum, or "**Dial**," is a compound of barbitone soluble in water. It acts very rapidly and given in tablet form, the dose being 1 to 3 tablets, 3 gr.

Phenobarbitone, or "**Luminal**."—This is a nerve sedative. It may be used in small doses in conditions of epilepsy, and it reduces the movements in chorea. It is used in the treatment of migraine and to lessen nervous symptoms in exophthalmic goitre. It is also used as a sedative in many chronic skin disorders. Dose $\frac{1}{2}$ to 2 gr.

Barbitone, or "**Veronal**." Dose 5 to 10 gr. in tablet form.

It is a very powerful hypnotic, acts quickly and produces a refreshing sleep. It is excreted by the kidneys. If taken over a long period it produces cumulative symptoms.

Barbitone soluble (Sodium barbitone), or "**Medinal**." Dose 5 to 10 gr.

Phemitone, or **Prominal**, is used chiefly for epilepsy. Dose $\frac{1}{2}$ to 6 gr.

Butobarbitone (**Soneryl**) is a more powerful hypnotic than barbitone.

Cyclobarbitone (**Phanodorm**) is a barbital derivative. It is used as a sedative in nervous conditions.

Narcotics.

Narcotics are drugs which cause deep resembling coma. They may also be called an hypnotics, because they are accompanied by abolition of pain. The chief narcotic used is opium and its active principles or derivatives.



FIG. 7.—POPPY HEADS.

Opium is the juice obtained from the white poppy, or *Papaver somniferum*. Its active principles are morphine, codeine, and papaverine. The chief action of opium and its active principles is to depress the perceptive and sensory areas and relieve pain. Sleepiness and drowsiness are produced by decreased sensitiveness to afferent impulses. It is used chiefly as an analgesic and a hypnotic, and the sleeplessness is

relieved by the addition of a stimulant to pain. It depresses the respiratory centre and lessens all secretions excepting sweat, which it increases. It is constipating, because it checks intestinal peristalsis, and it causes contraction of the pupil.

Preparations in use containing opium:

Tinctura opii, or **Laudanum**, 30 minims, contains $\frac{1}{3}$ gr. morphine. Dose 5 to 30 minims.

Nepenthe is a liquid preparation of opium containing 1 gr. morphine in 130 minims. It is frequently prescribed for children, the dose being 1 minim each year of life.

Tinctura opii camphorata, or **Paregoric**.—

contains $\frac{1}{30}$ gr. morphine in 60 minims. Dose 30 to 60 minims.

Pulvis ipecacuanhæ compositus, or **Dover's powder**, contains opium 10 per cent., ipecacuanha 10 per cent. Dose 5 to 10 gr. 10 gr. contain $\frac{1}{10}$ gr. morphine.

Omnopon, Papaveretum, contains the alkaloids of opium in the form of soluble hydrochlorides. It causes less nausea than morphine, and has a less depressing effect upon the respiratory centre.

Dose: by mouth, tablets containing $\frac{1}{6}$ gr. omnopon, contain $\frac{1}{12}$ gr. morphine. By injection, tablets $\frac{1}{3}$ gr. omnopon, containing $\frac{1}{6}$ gr. morphine, 1 c.c. ampoules of 2.16 per cent. solution containing $\frac{1}{3}$ gr. omnopon.

Morphine Preparations.

Liquor morphinæ hydrochloridi. Dose 5 to 30 minims.

Suppository of morphine containing $\frac{1}{4}$ gr. in oil of theobroma.

Morphine hydrochloride. Dose $\frac{1}{8}$ to $\frac{1}{3}$ gr.

Codeine phosphate. Dose $\frac{1}{4}$ to 1 gr.

This is an alkaloid obtained from opium and a derivative of morphine and is used for depression of the cough reflex. It is less depressing than morphine and is used often to relieve pain associated with cough. It is given in the form of a linctus. It is excreted by the kidneys.

Diamorphine hydrochloride, or Heroin.—A derivative of morphine. Dose $\frac{1}{24}$ to $\frac{1}{8}$ gr.

This is used most often as a respiratory sedative to relieve cough in laryngitis and bronchitis. It is a dangerous drug, because it very easily produces addiction.

"Dilaudid."—A derivative of morphine. Dose $\frac{1}{12}$ gr. by mouth, $\frac{1}{32}$ gr. by injection.

This is given chiefly for its analgesic effect. It has very little action on the bowel and is not constipating.

Analgesics.

There are certain other drugs which are used for their analgesic effect. Because they relieve pain they indirectly produce sleep. They are often combined with hypnotics to increase their effect, and they are also antipyretic in their action.

Acetyl salicylic acid, or Aspirin. Dose 5 to 10 gr.

This is given sometimes for its analgesic effect in relieving headache and neuralgia. Locally it has a slight anæsthetic effect and is given as a mucoanalgesic after tonsillectomy.

"Anadin" is a proprietary preparation containing aspirin, phenacetin, caffeine and quinine. It is used chiefly for neuralgia.

Veganin contains aspirin, codeine and phenacetin. Dose 1 to 2 tablets.

This is given to relieve pain of all kinds.

Antifebrin, or Acetanilidum.—This is anodyne in its action and is given to relieve headache.

Amidopyrine, or Pyramidon. Dose 5 to 10 gr.

This resembles phenacetin in its action, but its effect is more prolonged in its effect. In some people it causes poisoning of blood-forming cells in the bone marrow. It is combined with barbiturate in a compound form as "allonal" and "veramon."

Phenacetin, Acetphenetidin. Dose 5 to 10 gr.

This is a nerve sedative and analgesic which diminishes sensation to pain and gives relief in headache, migraine and neuralgia.

Phenazone, Antipyrin. Dose 5 to 10 gr.

This is given for the relief of headache.

Pethidine hydrochloride is a synthetic preparation which is chemically and pharmacologically related to morphine and atropine. It is an analgesic and antispasmodic. It is of particular value in visceral pain and is used in the treatment of muscular spasm. It may be given

by mouth or by injection. Continued use, particularly by injection, may cause drug addiction.

Dose 25 to 100 mg. orally; 50 to 100 mg. intravenously.

Physeptone (Miadone) is a synthetic compound containing powerful analgesic and spasmolytic properties. It is of particular value in genito-urinary operations and it has been found to be as effective as morphine in relieving pain of all types.

For pre-operative use it is given in conjunction with one of the short-acting barbiturates or with hyoscine. It has a marked depressant effect on the cough reflex, and in this respect resembles codeine.

It may be given orally or by intramuscular or intravenous injection. Dose 10 mg. at intervals of 4 to 6 hours.

Toxic effect: It may produce dizziness and sweating. Nausea and vomiting are rare. Tolerance to the drug is not readily developed and therefore continued doses may be given with safety.

Phenadoxone (heptalgin) is considered to be effective in abolishing pain. It produces no hypnotic effect and has only a slight depressant effect upon respiration. It is non-irritant to the gastric mucosa and non-constipating.

It can be given by mouth, by intravenous or by subcutaneous injection. Dose 10 to 30 mg. by mouth; 5 to 10 ml. of solution (10 mg.) by injection.

Metapon or methyldihydromorphine is a powerful analgesic. It has no narcotic effect, and is therefore less useful than morphine, except for prolonged administration in incurable conditions. Dose 6 mg. by mouth.

Intravenous **Procaine** is given to relieve pain, to patients who are suffering from burns and injuries, and to relieve irritation in patients who are suffering from pruritus and urticaria.

ANÆSTHETICS

Anæsthetics may be divided into:

- General anæsthetics.
- Basal narcotics.
- Local anæsthetics.

General Anæsthetics.

General anæsthetics produce insensibility to pain, a loss of sensation and loss of consciousness followed by deep sleep.

General anæsthetics include:

- Ether.
- Vinyl ether.
- Chloroform.
- Trichlorethylene.
- Ethyl chloride.
- Nitrous oxide gas.
- Cyclopropane.

Ether was formerly the commonest anæsthetic in use. When inhaled it is rapidly absorbed, and affects the brain, heart and respiration. At first it causes irritation, the patient experiences a choking sensation and there is profuse secretion of saliva. The face becomes flushed and the pupils are dilated. The patient becomes excitable and talkative. He then becomes calm, quiet and unconscious, the muscles are relaxed and the patient is in coma. Ether stimulates the heart, circulation and respiration. The pulse becomes strong, the breathing is deep, regular and rapid. It causes an increase in the blood pressure.

The poisoning effects show themselves in irregular, gasping respiration. The face becomes cyanosed, the blood pressure drops, the pulse becomes weak, and death may result from respiratory paralysis.

The after-effects of ether are nausea, vomiting, great thirst and headache.

Before ether anæsthesia is given the patient is usually given an injection of atropine $\frac{1}{100}$ gr. half an hour before operation.

Ether is highly inflammable and should not be given if a cautery is to be used. There should be no open fire in the room. It is not usually given to people suffering from conditions associated with high blood pressure and pulmonary symptoms.

Methods of giving Ether.—It is given by inhalation by means of the open or closed method.

It may be given per rectum or intravenously. When given per rectum it is given in olive oil.

It is given by the intratracheal method, warmed ether vapour being passed down the trachea by means of a gum-elastic catheter or special tube inserted by means of a laryngoscope. This is an especially useful method for operations which are to be performed about the face, neck and head.

When given intravenously, a 5 per cent. solution of ether in normal saline is used.

Vinyl Ether (Vinesthene).—A colourless, volatile, inflammable substance which causes very rapid, deep and safe anæsthesia. It has no irritating effect and does not impair circulation or respiration. It is given by the closed or open method with oxygen. It is used in obstetrics when Cæsarian section is performed.

Chloroform is prepared from a combination of alcohol and chlorine. It is absorbed very quickly and produces anæsthesia very rapidly. It produces the same effect upon the nervous system as alcohol. It rapidly depresses the higher centres, pain is abolished, paralysis of the motor areas and abolition of special reflexes occur. It is a more dangerous anæsthetic than ether, but is given when a cautery is to be used, and to patients suffering from bronchial conditions. It depresses the heart and

respiration, and death may result from heart failure. It is administered by the open method by sprinkling chloroform on to a fold of lint or on to a mask.

Chloroform Poisoning.—The pulse becomes small and weak, the face is pale, the respirations shallow and the pupils are dilated.

Treatment.—Caffeine and atropine are given as stimulants. Artificial respiration is applied and inhalations of oxygen and carbon dioxide are given.

Delayed Chloroform Poisoning.—The symptoms of this appear a few days after the anæsthetic has been given. It is due to destruction of liver cells which undergo fatty degeneration. The patient has acidosis; he suffers from nausea and vomiting, he becomes jaundiced and has delirium and convulsions. The treatment for this condition is glucose with saline.

Chloroform and ether may be given together as a mixture. It is given by the open method.

Trichlorethylene.—Heavy and colourless, with a smell resembling chloroform and produced commercially as "Trilene."

It has no irritating effect and causes no post-operative vomiting; its induction is quick and pleasant. It is non-inflammable. It is given by the closed method by means of a Boyle apparatus or special type of apparatus. It is used sometimes as an adjuvant to gas and oxygen and has been used in midwifery and dentistry.

Ethyl Chloride.—This is given as a general anæsthetic for operations of slight duration. It is frequently used for children, and can be given by the open or closed method. It produces very rapid anæsthesia, and it is owing to this fact that it may be dangerous, as an overdose may readily be given. It is very often given in dental practice, and for minor surgical operations.

Nitrous Oxide Gas, N_2O .—This is a depressant to the cerebral centres, and produces very rapid anæsthesia with practically no after-effects. It is often combined with oxygen to allow for a more prolonged anæsthesia, and ether may be used as a supplementary anæsthetic. It is given by inhalation by means of special apparatus. It may cause cyanosis, dyspnoea and convulsions. It is used chiefly in minor surgical work and in dentistry. It is the best type of anæsthetic for patients already suffering from shock.

Cyclopropane, or Trimethylene.—This is of value chiefly as a supplement to nitrous oxide gas and oxygen, and after induction, with pentothal. It is given by the closed method. It is also greatly used in thoracic surgery, being of particular value in such work, because it is non-irritating to the membrane of the respiratory tract. It is compressed into cylinders and has explosive properties, therefore it must be used with caution.

After-effects are very uncommon, but there is some danger of respiratory failure.

Basal Narcotics.

Basal narcotics are drugs which are administered before operation to produce unconsciousness in the patient in order to allay anxiety and fear. The patient is asleep before he is taken to the theatre, therefore a lesser amount of anæsthetic is required. In some cases only gas and oxygen are given afterwards. In nearly every case premedication is given to the patient in the form of injection, morphine $\frac{1}{2}$ gr. or omnopon $\frac{1}{2}$ gr. with scopolamine $\frac{1}{150}$ gr., given about three-quarters of an hour before operation.

Tribromethyl alcohol, or Bromethol, or Avertin.

Dose 0.1 gram per kilogram of body weight.

It is made up in a $2\frac{1}{2}$ per cent. solution in distilled water and is given per rectum at body temperature. It readily decomposes and should be tested immediately before being given. This is effected by adding two drops of a 1 in 1,000 solution of Congo red to 5 c.c. of avertin. The colour should remain orange red; if it does not, the solution should not be given. It must not be reheated. It is used much for operations on the thyroid gland and cerebral operations. It should be administered slowly, and by the time the drug has been given the patient should be asleep. He should never be awakened after its administration. Its use is contra-indicated for people suffering from renal disorders, as it is excreted by the kidney. The bowel should be washed out at least four hours before the avertin is given; it is better if an enema be given the night before. The poisoning symptoms are cyanosis, slow respiration and low blood pressure. Coramine and oxygen should be at hand.

Avertin is sometimes given to relieve the spasms occurring in tetanus.

Paraldehyde.—This is also given per rectum, the dose being 45 minims to 1 drachm for every stone in body weight, not exceeding 10 drachms. It is given in olive oil or normal saline, 1 ounce of olive oil or saline being used for every drachm of paraldehyde. After operation a rectal wash-out should be given because paraldehyde may prove irritating to the rectum.

The Barbiturates.

The barbiturates are a group of drugs given as basal narcotics. They are given either intravenously or in some cases by mouth.

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Pentobarbitone ("Nembutal").—This drug is given by mouth, per rectum or intravenously.

Dose: 1 capsule containing $1\frac{1}{2}$ gr. is given to the patient the night before operation and a further one or two capsules one hour before operation. Intravenously the maximum dose is $7\frac{1}{2}$ gr.

Similar preparations are **Seconal** and **Soneryl**, which produce the same results.

Soluble Hexobarbitone, or **Sodium Evipan**.—A 5 per cent. solution is used and the dose is regulated according to the age, weight and sex of the patient, and should not exceed 10 c.c. It is injected slowly into a vein in the arm, at a rate of 1 c.c. every 15 to 30 seconds. It is very rapid in its effect, anæsthesia occurring in a few seconds, but it is of short duration only. It may be used as an introductory anæsthesia, and is used for minor surgery. There is a danger of respiratory failure, and it is not as a rule given to people with impaired liver function.

Sodium Pentothal (**Soluble thiopentone**) is the most commonly administered general anæsthetic. It is given intravenously in a 5 per cent. solution, or a continuous infusion of 0.4 per cent. solution may be given. It is very effective, causing a smooth induction and rapid anæsthesia. It may produce an inflammatory reaction in the vein and cause respiratory embarrassment. It also produces a retrograde amnesia. Nikethamide should always be available when sodium pentothal is being given.

Kemithal is another of the barbiturates which is similar in action to pentothal and is of value in prolonged anæsthesia. It is given intravenously in a 5 per cent. solution. It may also be given per rectum. It causes very slight nausea, and vomiting is less than with other barbiturates.

Local Anæsthetics.

Local anæsthetics produce insensibility to pain in the tissues to which they are applied or into which they are injected.

They may be divided into:

1. Surface anæsthetics applied direct to tissue.
2. Freezing agents.
3. Drugs given by injection and local infiltration.
4. Regional anæsthetics.

1. *Drugs applied to the Tissues, or Surface Anæsthetics.*

Drugs are applied in the form of powders, suppositories, ointments and fluid preparations as anæsthetics.

Cocaine is used as a surface anæsthetic in the following ways:

For nasal operations gauze soaked in cocaine 5 to 10 per cent. with adrenaline is applied to the nostrils.

For throat operations a solution of cocaine is sprayed or painted over the surface.

Cocaine lozenges may be given containing cocaine $\frac{1}{60}$ to $\frac{1}{20}$ gr.

For operations on the eyes a 4 per cent. solution is instilled into the conjunctival sac.

Benzocaine.—Solutions 2 per cent. in olive oil or alcohol are used as sprays or are painted over mucous surfaces. It is used for burns and ulcers. It is also used in ointment form and in suppository form for anal fissure and hæmorrhoids.

Orthocaine, or Orthoform.—This relieves pain in a wounded surface and mucous membrane, and is applied in the form of powder, ointment and suppository.

2. *Drugs which Act by Freezing.*

Ethyl chloride is sprayed over the skin by means of a special container. It evaporates very rapidly, thus freezing the area over which it is sprayed. It is used for the extraction of teeth sometimes. Its advantage is that there is considerable pain afterwards. It may cause sloughing of the tissue. **Ether spray** is sometimes used.

3. *Drugs given by Local Injection and Infiltration.*

The term local injection implies an injection into the tissues at the particular site of operation. In order to anæsthetise a wider area, several injections are made round the circumference. This constitutes infiltration injection.

Procaine Hydrochloride or **Novocaine** or **Plano-caine**.—This is used with adrenaline to increase the degree of analgesia and to lessen capillary hæmorrhage. A 2 per cent. solution is used for local and infiltration injections. It is less toxic than cocaine.

Ethinocaine (Nupercaine, Percaine).—A 0·1 per cent. solution is used for local infiltration. It is less rapid in action than cocaine, but its action is more powerful and prolonged. It is combined with adrenaline.

‘Proctocaine’ contains 1·5 per cent. procaine with benzyl alcohol and butyl-*p*-aminobenzoate. It is used for rectal anæsthesia in hæmorrhoids and anal fissure.

Etylocaine is used for surface anæsthesia, infiltration and block anæsthesia.

4. *Regional Anæsthetics.*

Regional anæsthesia is a condition in which sensation of pain in a whole area is abolished by paralysing part of the sensory fibres supplying that

area; by the injection of a drug round the trunk of a mixed nerve. The same substances are used as for local injection.

Block Anæsthesia.—An injection is made into a nerve supplying the arm or the leg in order to produce anæsthesia in the whole limb for cases of reduction of fracture. Similarly in dentistry an injection will be given into a nerve, producing anæsthesia in part of the jaw.

A **spinal anæsthetic** is a type of regional anæsthesia. When a spinal anæsthetic is given a loss of sensation occurs in the area supplied by the lower dorsal, lumbar and sacral nerves.

“Heavy” and “light” solutions are the terms used to denote the difference in the specific gravity of the spinal anæsthetic solution, as compared with the specific gravity of the cerebro-spinal fluid.

The injection is given into the lumbar region of the spinal cord with the patient in the lateral or sitting position, according to the type of solution used. If a “light” solution is used the patient should be in the lateral position, and the head and shoulders should be kept low for a short time until the anæsthetic becomes fixed, and there is no danger of it gravitating to the medulla oblongata, thus causing respiratory paralysis.

If a “heavy” solution is used the patient is kept in the sitting position for a short time, and when the anæsthetic is fixed the appropriate position for the operation can be assumed.

Spinal anæsthesia causes a lowering of the blood pressure, therefore ephedrine is usually given as a preventive measure. This form of anæsthesia is indicated in those people who are unable to take a general anæsthetic, such as people suffering from pulmonary tuberculosis, heart disease, diabetes, etc. It is also given to people for abdominal operations.

because it causes complete relaxation of the abdominal muscles.

In every case premedication is given in the form of omnopon $\frac{1}{2}$ gr. or morphine $\frac{1}{4}$ gr. half an hour before the injection.

After-Effects.—There is a danger of headache due to fall in the blood pressure. To prevent this the foot of the bed should be raised on blocks, and pillows should be added singly under the head until the desired position for nursing the patient is attained.

Drugs used as Spinal Anæsthetics.

Nupercaine.—Used in “heavy” and “light” solutions. It has a powerful and prolonged action. It may cause symptoms of circulatory collapse, cyanosis and respiratory paralysis.

Spinocaine.—This is a mixture of procain, tetracaine and alcohol.

Amethocaine hydrochloride (decicaine) 0·5 per cent. solution. Its properties resemble those of cocaine.

DRUGS PRODUCING MUSCULAR RELAXATION

Certain substances are used as accessories to general anæsthetics in abdominal surgery to lessen the amount of anæsthesia required to bring about complete relaxation of the muscles. Normally, at the junction of a nerve with a muscle, a substance, acetylcholine, is secreted which enables nerve impulses to pass on to muscles, keeping them in a state of tension. The drugs used in producing muscle relaxation act by preventing the formation of acetylcholine and therefore the muscles remain relaxed.

Curare is the active principle of a drug which originated from the South American arrow poison, which was derived from a creeper-like plant, the *Strychnos toxifera*.

It is given in conjunction with anæsthetics intravenously in small doses as a rule just before surgeon is about to open the peritoneum; the patient is previously anæsthetised with sodium pentothal followed by cyclopropane. It lessens the amount of anæsthetic required.

Preparations of curare:

d-Tubocurarine chloride ("Tubarine"). Dose to 20 mg. (1.5 to 2 c.c.).

Intocostin. Dose 3 to 5 ml.

Dangers of curare:

The diaphragm has a higher resistance to curare than any other muscle, so that respiration, although diminished in strength, continues after an injection of curare. The danger of the drug lies in the fact that an overdose would paralyse all the nerve muscles concerned in the act of respiration. In this event immediate artificial respiration must be performed, and physostigmine may be used as an antidote.

Mephenesin (Myanesin), a colourless, crystalline synthetic chemical, has similar properties to curare. It is less toxic and is given in a 10 per cent. solution.

Flaxedil is a synthetic substance which has muscle relaxing properties similar to those of curare, but with slightly more rapid onset and shorter duration.

Scoline is another muscle relaxant of ultra-short action.

Decamethonium iodide (C 10) is given as a neuromuscular blocking agent to increase muscle relaxation in the lighter planes of general anæsthesia in abdominal surgery, and in electro-convulsive therapy.

Dose; in surgery it is given intravenously in doses of 1 to 3 mg. until relaxation is achieved. In electroconvulsive therapy, 0.5 mg. per stone of body weight is used.

Pentamethonium iodide (C 5) is also used, or i

may be given as an antidote to C 10. After its administration the patient must be kept in the supine position to diminish the effects of orthostatic hypotension which the drug produces.

PARASYMPATHETIC STIMULANTS

Stimulation of the parasympathetic nervous system results in contraction of the pupils, slow action of the heart, increased secretion, and peristaltic action. The chief drugs used are the **diaphoretics**, which increase the secretion of sweat.

Pilocarpine is obtained from the leaves of Jaborandi, a Brazilian shrub, the *Pilocarpus microphyllus*. The chief effect of pilocarpine is upon the secretory glands. It increases salivation and causes profuse perspiration. It increases the tone and movements of the stomach. It depresses the heart's action and makes the pulse slower and weaker. The respirations become increased in rate and depth.

It is used chiefly to encourage diaphoresis in the treatment of conditions of nephritis and uræmia in conjunction with a hot pack. Dose $\frac{1}{20}$ to $\frac{1}{5}$ gr.

It may be given by mouth or by injection.

Physostigmine, or **Eserine**.—This is an alkaloid of the Calabar bean. It causes increased peristalsis and contraction of all involuntary muscle, and is used in conditions of intestinal atony.

Preparations Used.—Eserine $\frac{1}{100}$ to $\frac{1}{50}$ gr. by injection.

"Prostigmine" is a complex synthetic chemical substance which acts in the same way as physostigmine. It is used in the treatment of myasthenia gravis, which is a condition characterised by extreme fatigue in muscle after use.

The drug is given by mouth or by injection. Dose, usually, 15 mg.; 2.5 mg. in 1 c.c., by injection.

PARASYMPATHETIC DEPRESSANTS

Parasympathetic depressants check secretion, lessen activity of the involuntary muscles. They paralyse the parasympathetic endings.

Belladonna.—Obtained from the leaf and root of the plant deadly nightshade. Its active principles are atropine, hyoscyamine and hyoscyne. Applied



FIG. 8.—DEADLY NIGHTSHADE (BELLADONNA).



FIG. 9.—HENBANE.

locally, belladonna relieves pain by relaxing muscle spasm and is used in the form of a plaster. It causes the pupils to dilate. Atropine given internally checks secretion, and is used in gastric cases to relieve pain. It lessens the contraction of involuntary muscle, and is used in various preparations to treat the condition of pyloric stenosis. It lessens the secretion of all glands, including the bronchial secretion. It stimulates

the brain, this stimulation being followed by delirium and coma. It accelerates the action of the heart by paralysing the vagus nerve endings, and for this reason and for the fact that it checks secretion it is given before ether anæsthesia. It stimulates respiration.

Atropine sulphate, dose $\frac{1}{240}$ to $\frac{1}{60}$ gr.

Hyoscyamus, obtained from henbane, contains hyoscyamine, hyoscyne, and atropine. The action of hyoscyamus resembles that of belladonna. It is used chiefly for its sedative effect in combination with other drugs as aperients and diuretics.

Hyoscyne hydrobromide, or **Scopolamine**. Dose $\frac{1}{60}$ to $\frac{1}{100}$ gr.

Obtained from hyoscyamus leaves. It is hypnotic and its effect by producing depression of the cerebral centres. It is given in conditions of excitement, as mania and delirium tremens. Combined with morphia, it may be given as a narcotic before operation.

Hyoscyamine is obtained from hyoscyamus and has an action similar to atropine, and is used in the treatment of mania and delirium tremens.

DRUGS USED FOR SPECIFIC DISEASES

Drugs used in the Treatment of Parkinsonism.

Hyoscyne hydrobromide is used specifically to relieve severe spasm and muscular rigidity. Dose $\frac{1}{5}$ to $\frac{1}{100}$ gr.

Trihexylphenidyl (Artane) is a synthetic antispasmodic. It resembles atropine in its control of diarrhoea, cycloplegic effects and cerebral stimulation. It is devoid of the unpleasant effects of atropine on the heart and circulation, and has been found successful in relieving symptoms.

Parpanit, a synthetic antispasmodic related to atropine, is also used.

Lysivane (N-2-diethylamino-*n*-propyl) phenothiazine hydrochloride. Dose 4-10 tablets daily.

This drug is a valuable remedy in the treatment of Parkinsonism. It is combined sometimes with stramonium.

Drugs used in the Treatment of Mental Disorders.

Insulin is given in the treatment of schizophrenia with the object of producing temporary states of hypoglycæmic coma. The patient is gradually reduced to a state of coma, and is kept in this state for 4 to 5 hours and then glucose is given. This treatment must be given over a prolonged period.

Somnifaine, a barbituric acid derivative, produces unconsciousness, and is given to patients suffering from certain mental disorders.

Leptazol, or **Cardiazol**, is given in large doses by intravenous injection. An epileptic fit is thus produced in the patient, and it lasts about 90 seconds followed by a state of unconsciousness and sleep. This treatment is given two or three times a week.

Soluble thiopentone is given intravenously for narco-analysis in cases of anxiety states, borderline psychoses, hysteria and malingering.

Drugs used to diminish Convulsions and Epilepsy

The drugs used are:

Bromides.

Phenobarbitone, or **Luminal**.

Phemitone (**Prominal**), a derivative of phenobarbitone.

Hydantoinates are powerful suppressives of epileptic convulsions.

Two commonly used are:

Phenytoin Sodium (Sodium diphenylhydantoinate), proprietary preparations of which are *Epanutin* and *Dilantin*.

Epanutin (Dilantin), a sodium salt of diphenyl hydantoin, is given in the treatment of epilepsy. The dose is $1\frac{1}{2}$ gr., given by mouth in capsule form three or four times a day. It should be taken with plenty of water.

It may produce symptoms of dizziness and tremor, pyrexia and rash.

Mesantoin has a similar effect.

Phenobarbitone is usually given with these drugs. The toxic effects are dizziness, tremors, pyrexia, rash and gastric upset.

Tridione is given in petit mal, in daily doses of 1 to 2 grammes for adults, in capsule form. The capsule should be taken with food followed by a liberal volume of fluid if it causes gastric discomfort.

Alcohol.

Alcohol is obtained from sugars fermented by the action of yeast. It is used for many purposes, a summary of which will be given below.

Locally.—Applied locally to the skin, alcohol has the effect of hardening it and checking perspiration. It is therefore both astringent and anhydrotic in effect.

It is used as a surgical dressing in a 90 per cent. solution to cause dehydration of tissue, as in the treatment of a moist gangrene. It is also an antiseptic, and is used as a solvent for skin antiseptics, iodine and picric acid.

It acts as an antipyretic both in its local application and by its action of dilating the bloodvessels and stimulating the sweat glands. It is used in the form of methylated spirit as an evaporating lotion. It is analgesic in effect when applied to the gums in

toothache, and absolute alcohol is used to relieve in trigeminal neuralgia by its injection in the gasserian ganglion.

Internally.—It affects the alimentary, circulatory, respiratory and nervous systems.

In the stomach its action is to increase and improve digestion by stimulation of the appetite and secretion of hydrochloric acid. For this latter purpose it is used sometimes as a carminative in intestinal colic and flatulence. It is absorbed both in the stomach and the intestine. By its irritant action on the mucous membrane of the stomach it causes, reflexly, through the medulla, stimulation of the circulatory and respiratory systems.

It stimulates the heart and increases and strengthens the pulse beat. It causes dilatation of the peripheral bloodvessels and stimulation of the sweat glands.

It causes stimulation of respiration, increasing both its rate and depth. It is a depressant of the nervous system, causing first of all a sensation of exhilaration and mental stimulation by removal of normal restraint and inhibition of speech and behaviour. This is the result of diminished activity of the more highly developed mental functions of the brain. This is followed by a depressing effect on the motor and sensory functions, the medulla and spinal cord, resulting in coma.

Food Value.—Alcohol has a distinct food value, 1 gram of alcohol producing 7 calories. It provides energy for the tissue cells, and can act as a substitute for fats and carbohydrates and conserves proteins. Because of this it is sometimes given in small amounts in debilitating illnesses.

Its value as a hypnotic is that in small doses it depresses the higher centres and relieves anxiety, fears, and allays restlessness and distress, and may induce sleep.

Preparations of Alcohol Used.—Absolute alcohol contains 99 per cent. alcohol.

Spiritus rectificatus contains 90 per cent. alcohol.

Industrial methylated spirit contains alcohol 95 per cent. and wood naphtha 5 per cent.

Alcoholic Beverages or Distilled Liquors.

Brandy (*Spiritus vini gallici*) contains 40 per cent. alcohol. This is made by distilling fermented juice of fresh grapes. It contains a small amount of annin.

Gin is made by distilling fermented rye and barley. It is flavoured with juniper, which causes it to have diuretic effect.

Whisky, or *Spiritus frumenti*, contains 40 per cent. alcohol, and is made by distilling fermented grain.

Wines are fermented liquors made from grapes. They also contain various acids and volatile oils.

CHAPTER IX

ANTIPYRETICS—SPECIFIC DRUGS— VACCINES AND SERA

ANTIPYRETICS

ANTIPYRETICS are drugs which reduce temperature. They are not so commonly used nowadays to reduce temperature, and if there is a danger of high fever it is probably better to reduce it by tepid sponging. Antipyretics act in the following ways:

1. Certain drugs act by increasing the heat loss from the skin. They stimulate the sweat glands and cause dilation of the peripheral blood-vessels—*i.e.*, they are vasodilators in their effect.

2. Certain drugs have a depressing effect upon the heat-producing centre.

3. There are certain drugs termed specific antipyretics because they exert a toxic effect upon the organism causing the illness.



FIG. 10.—ACONITE.

Antipyretics which Act through their Action on the Skin.

The drugs used for this purpose are:

Aconite.

Alcohol.

Ipecacuanha.

Aconite is obtained from monk's-hood used in the form of tincture of aconite. It lowers the temperature by its effect upon the sweat glands and peripheral bloodvessels.

Alcohol.—See p. 107.

Ipecacuanha.—This is obtained from the root of the ipecacuanha plant. It acts reflexly by its irritating effect upon the gastric mucous membrane. It is combined with opium in the preparation of Dover's powder, or pulvis ipecacuanhæ compositus. Opium enhances the diaphoretic action of ipecacuanha. *Ipecacuanha Præparata*. Dose $\frac{1}{2}$ to 1 gr.

2. Antipyretics which Depress the Heat-regulating Centre.

These drugs depress the heat-regulating centre and increase the elimination of heat.

They include:

Acetyl salicylic acid.

Acetanilidum.

Amidopyrine.

Phenacetin.

Phenazone.

Acetyl Salicylic Acid (Aspirin). Dose 5 to 10 gr.

Aspirin.—A drug obtained first from the bark of the willow (*salix*) or poplar (*populus*), but now prepared synthetically from coal tar. It acts very rapidly and produces very free perspiration. It is given in febrile conditions because it acts also as an antipyretic and is useful for relieving headache, and thus gives help in inducing sleep.

Acetanilidum, or Antifebrin, a chemical substance formed from dyes. It acts as a powerful antipyretic.

its depressing effect upon the heat-producing centre. It is also an anodyne.

Amidopyrine, or Pyramidon. Dose 5 to 10 gr.

This acts more slowly than the other antipyretics of this kind, but it is more prolonged in its effect. It is very liable to produce agranulocytosis and must not be administered habitually.

Phenacetin, or Acet-phenetidin. Dose 5 to 10 gr.

A coal-tar product. This acts by its effect upon the heat-regulating centre. It causes increased perspiration and dilatation of the peripheral vessels, and the temperature may be reduced within 2 hours of its administration. It is also given as a nerve sedative and an anodyne.

Phenazone, or Antipyrin. Dose 5 to 10 gr.

This acts more quickly than other antipyretics, but its action is less prolonged.

3. Specific Antipyretics.

These drugs exert a toxic effect on the causal organism of the illness. They are:

Sodium salicylate given in acute rheumatism.

Quinine given in malaria.

Sulphonamides given for a variety of febrile conditions.

These will be fully discussed in the section on Specific Drugs.

SPECIFIC DRUGS

Specific drugs are given to cure particular diseases. In some cases the drug has a specific action on the causal organism of the disease, in others the symptoms may be relieved.

Specific drugs are used in the treatment of the following conditions :

Dysentery.

Malaria.

Acute Rheumatism.

Syphilis.

Drugs used in the Treatment of Dysentery

Emetine is the active alkaloid of ipecac and is used specifically in the treatment of dysentery. It is antiseptic in action, being of value in the destruction of amœbæ.

Preparations Used.—Emetine hydrochloride daily for 10 days. It is given by hypodermic injection.

Emetine bismuth iodide (E.B.I.) 1-3 gr. daily for 10 days. It is usually given in gelatine capsules to prevent its being dissolved in the stomach.

Other drugs used are:

Acetarsol, or **Stovarsol**, an arsenical preparation given by mouth in between the courses of emetine.

Dose 1 to 4 gr. daily.

Chiniofon, or **Yatren**.—Chiniofon, or Yatroquin, contains iodine and is given by mouth in capsule form, in a dose of 4 to 8 gr. three times daily, or a 2½ per cent. solution as a retention enema. 10 grammes in 200 c.c. are given at a time.

Diodoquin, a more recent iodine-containing preparation is more efficient than chiniofon and is given by mouth.

Sulphaguanidine, a sulphonamide preparation used in the treatment of bacillary dysentery. It is only partly absorbed from the bowel and is given in doses of 6 to 8 grammes initially followed by 4 grammes 4-hourly. Other sulphonamides may be used in the usual doses.

Drugs used in the Treatment of Malaria

Quinine is obtained from the bark of cinchona. It is a protoplasmic poison and destroys the

nodia. It is given both as a prophylactic measure and in the treatment of malaria.

The dose varies according to the type of malaria being treated. Prophylactic doses are 6 to 10 gr. daily.

In the treatment of malignant malaria intravenous injections of quinine bihydrochloride are given.

Symptoms of Poisoning in Treatment.—These result from the cumulative effect of the continued use of quinine. The most characteristic symptom is buzzing noises in the ears, and there may be deafness. There is headache, dimness of vision, nausea and vomiting. The pulse is slow and weak and may be irregular, and there may be collapse.

Mepacrine hydrochloride, or **Atebrin**, is a synthetic preparation. It is given by mouth and by intravenous injection. It is slower in action than quinine. Dose 200 mg. (2 tablets) t.d.s. for 2 days. 100 mgm. (1 tablet) for 5 days in acute attacks. Prophylactic dose 1 tablet per day.

Proguanil (Paludrine) is a complex synthetic guanide and is highly effective in the treatment of the malarial attack. It has no toxic effects.

Chloroquine is used in the treatment of an attack in doses of 300 mg. It is an effective suppressant and is less toxic than mepacrine.

Other drugs which are prophylactic and curative are:

Pamaquin or **Plasmoquine**, which is sometimes used in combination with quinine.

Pentaquin, which is similar to pamaquin but is less toxic. The toxic effects of these drugs are gastrointestinal disturbances, methæmoglobinæmia, hæmolytic anæmia and hæmoglobinuria.

Drugs used in the Treatment of Acute Rheumatism.

The drugs used in the treatment of this disease are

the salicylates. Salicylates are formed by the combination of an alkali with salicylic acid.

Sodium Salicylate is a combination of sodium salicylic acid. It is usually prescribed with doses of soda bicarbonate to prevent gastric irritation. It is given in a mixture by mouth in large doses



FIG. 11.—WINTERGREEN.

the commencement of the illness. It reduces the temperature and causes profuse sweating. It relieves the pain, shortens the course of the illness.

Methyl Salicylate (Wintergreen).—This is applied locally in the form of liniment or ointment. It is a rubefacient and an anodyne, and is applied to the inflamed joints.

The liniment contains olive oil, the ointment lanolin.

The liniment may be rubbed into the joints or it may be applied on lint. The ointment is best applied spread on lint.

Symptoms of poisoning with salicylates are buzzing in the ears with a sensation of fullness in the head. There is deaf-

ness of vision and profuse perspiration, accompanied by an unpleasant sore condition of the throat and nausea and vomiting. In extreme cases there may be dyspnoea, collapse and unconsciousness.

Salicylamide (O-hydroxybenzamide) is a white crystalline substance. It has marked analgesic, antipyretic and antirheumatic properties. It is well tolerated and causes no toxic effects. Dose 10 g. daily.

H.P.C. (3 hydroxy-2-phenylcinchoninic acid). The use of this drug in rheumatic fever rapidly controls fever, malaise and acute arthritis. It increases the rate of excretion of uric acid. It may cause nausea, vomiting, abdominal pain and diarrhoea.

It is more effective when given in a single dose or at shorty spaced intervals as three doses at hourly intervals after breakfast. Dose, 4 to 6 tablets of 50 mg. daily.

Drugs used in the Treatment of Syphilis.

Drugs used in the treatment of syphilis include:

Penicillin.

Bismuth.

Arsenic.

Potassium iodide.

Penicillin.—The effect of the use of penicillin in the treatment of syphilis has had revolutionary results. It is usually given in conjunction with other drugs such as bismuth and arsenic.

A course of procaine penicillin is given daily in doses of 600,000 to one mega unit by intramuscular injection for 10 to 14 days. It is usually followed by a course of **Bismuth**. A suspension of bismuth metal in glucose is used as " Bisglucol," " Bismostab." Dose 0.03 to 0.1 G. by intramuscular injection usually for ten weeks.

The toxic symptoms of bismuth show themselves as an increased salivation, soreness and bleeding of the gums and stomatitis. The urine becomes scanty and albuminuria may develop. Dermatitis may result and general toxæmia.

The symptoms will usually clear up if the drug is stopped, or sodium thiosulphate may be given. The dermatitis is treated by giving B.A.L. (Dimercaptopropanol) by intramuscular injection.

Arsenic may be used instead of bismuth but is not

often prescribed. The original preparation used salvarsan or 606, followed by neosalvarsan.

More recent preparations used are neoarsamine or novarsenobillon (N.A.P. or N.A.B.).

Mapharside, an oxide of arsenic, is similar in action to these substances but is less toxic and more stable.

These preparations are given intravenously and must be given with care. Penicillin is given in conjunction with them. The two substances produce synergic action and give a higher percentage of cure with a lower concentration of drugs.

Other preparations of arsenic, which may be used but which are less potent and less toxic are **Tryparsamide**, which is given intravenously and **Acetylarsan**, which is given by intramuscular injection.

The Action of Arsenic in Syphilis.—The arsenic compounds are toxic to the *Spirochæta pallida*. They combine with and destroy them.

Toxic Effects of Arsenic.—These may be headache, dizziness, loss of consciousness and collapse. There may be nausea and vomiting. Shivering attacks may occur, accompanied by a rise in temperature, vomiting and diarrhœa. Hæmorrhages may occur into the skin. Jaundice and exfoliative dermatitis may result.

Potassium iodide is given in the later stages of syphilis, in between the courses of arsenic and bismuth. It helps the action of these substances and is of particular value in the treatment of mucous conditions.

These newer drugs have replaced mercurial preparations in the treatment of syphilis after many hundred years.

The Sulphonamide Group of Drugs.

The sulphonamides are a group of complex organic chemical substances which have an effect in combating

infections by exerting a bacteriostatic action on the causal organism. It is thought that they inhibit the growth and multiplication of organisms in the body and increase phagocytes and stimulate the production of antibodies.

They fall into two groups:

1. *The Sulphanilamide Group*.—The first of the sulphonamides to be used was prontosil, which was found to break down in the body to the active principle sulphanilamide.

2. The second group are those drugs which are similar in structure to sulphapyridine, as sulphathiazole, sulphadiazine, sulphamerazine, urolucosil and many others, which are produced as trade preparations.

A combination containing sulphathiazole, sulphadiazine and sulphamerazine is available under the trade name "Sulphatriad."

The Uses of the Sulphonamides.

The main indications for sulphonamide therapy are in the treatment of meningococcal infection, in lobar pneumonia and erysipelas; and other streptococcal and staphylococcal infections which have proved resistant to penicillin. Sulphonamides are also of great value in urinary infections.

For Infections of the Bowel.—Sulphaguanidine, acetylsulphathiazole, phthalyl sulphathiazole and phthalidene are the four drugs used especially in the treatment of infections of the bowel and as a prophylactic measure in surgery. They are less absorbed than the other sulphonamides when given by mouth, and therefore remain in the bowel.

For Infections of the Eye.—Sulphacetamide (Alcid) is used particularly for infections of the eye. It is used as a preventive measure in gonococcal infections and in the treatment of industrial injuries

to the eyes. It is also used for corneal ulcers and blepharitis. It is prepared in a 10 to 30 per cent solution.

The Administration of Sulphonamides.

Where possible, administration should be by mouth. Most of the tablets are prepared as $\frac{1}{2}$ -gramme tablets. The first dose is usually large to produce a certain degree of concentration of the drug in the blood stream. The concentration is sustained by prescribed doses given at regular frequent intervals until several days after the temperature has become normal.

Sometimes the drug is given by injection, and for this purpose the sodium salts of the various preparations are used. These may prove irritating and are best given by the intravenous route, although they may be given by intramuscular injection. They should never be given by subcutaneous injection because of their liability to produce sloughing of the skin and tissues.

Sulphonamides are sometimes given locally in the form of ointment, cream and powder. The powder is sometimes combined with penicillin. The prolonged use of the sulphonamide creams and ointments often results in severe and intractable forms of sensitisation dermatitis.

Whilst the patient is having a course of sulphonamides, the fluid intake should be at least 4 to 6 pints daily to prevent the formation of crystals in the kidney. There is no indication for the prohibition of sulphur-containing foods in the diet, but purgatives should be avoided. Sulphides may be produced by the bacterial decomposition in the liquid faeces in the colon, when the contents of the small intestine have been hurried along by the action of a purgative.

To prevent nausea and vomiting alkalis may

sometimes be administered with the tablets. The tablets should be given crushed suspended in milk or in water.

The Toxic Effects of Treatment with Sulphonamides.

1. Cyanosis, due to the formation of sulphæmoglobin and methæmoglobin. The former is produced by purgation and phenacetin, and these should therefore be avoided. The latter can be prevented by giving patients tablets of methylene blue.

2. Nausea and vomiting. This most commonly occurs with sulphapyridine and can be avoided by giving the tablets crushed in milk or in water or in tragacanth mucilage.

3. Dizziness, headache and mental depression. All of these can be prevented by the administration of fluids freely.

4. Drug fever and rash; the rash rather resembles that of measles.

5. Hæmaturia and anuria. These occur chiefly with sulphapyridine and are due to the deposition of crystals in the kidney. They can be prevented by the administration of fluids.

6. Agranulocytosis is a rare but serious complication in which the leucocytes are diminished in number and may disappear. It occurs chiefly in patients who are intolerant to sulphonamides.

The Antibiotics.

An antibiotic is a substance produced by one living organism which is lethal to another. The antibiotics in use include penicillin and streptomycin.

penicillin.

Penicillin originates from a mould, the *Penicillium*

notatum. It is used as an antiseptic and chemopreventive agent and possesses the following properties:

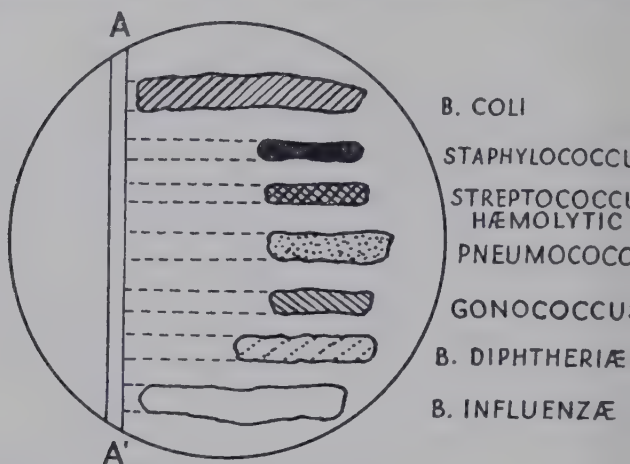


FIG. 12.—VARIOUS ORGANISMS PLANTED AT RIGHT ANGLES TO A GUTTER OF PENICILLIN 24 HOURS AFTER INCUBATION. *B. Coli* and *B. Influenzæ* are insensitive.

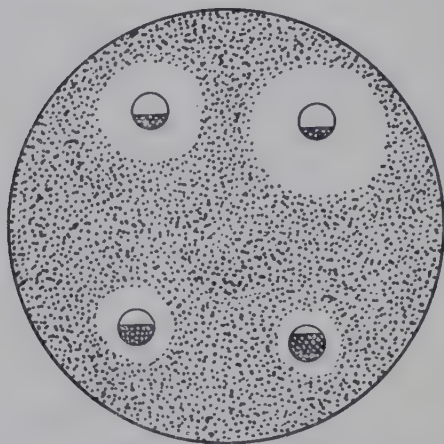


FIG. 13.—RINGS OF INHIBITION ROUND PORCELAIN CYLINDERS CHARGED WITH DIFFERENT STRENGTHS OF PENICILLIN.

1. It is active only against certain organisms, chiefly the Gram-positive.

2. Its antibactericidal properties are destroyed by heat, by long keeping, by acids and alkalis, and by the action of certain metals.

3. It is active in the presence of pus.

4. It has no toxic manifestations, except an urticarial rash.

It should be stored in a cool dry place.

The amount of penicillin given must be sufficient to produce bactericidal concentration in the infected focus, and it must be given for a sufficient length of time to eradicate the infection. The dose varies with the nature, site and severity of the infection and the sensitivity of the organism. It has an optimum concentration in its antibacterial effect beyond which an increase will be useless. The effect of a single dose can be prolonged by delaying absorption. A suspension of the drug may be given intramuscularly in a mixture of peanut oil and bees-wax. It may be given in an oily suspension or aqueous solution containing procaine.

It may also be combined with a vaso-constrictor substance such as adrenaline or ephedrine. The prolonged maintenance of effective penicillin concentration in the blood has been achieved by giving drugs which will interfere with its excretion. For this purpose **Caronamide** is used, and is given in doses of 3 grammes by mouth every three hours.

The conditions for which penicillin is particularly useful are for infections by a sensitive micro-organism, and it is used in the treatment of sub-acute bacterial endocarditis, venereal diseases, actinomycosis, respiratory infections, and infections due to staphylococcal, streptococcal and meningococcal organisms. Organisms are liable to become resistant to it, so that it must be used with discretion and in full dosage for effective control. Resistant organisms may be overcome by abnormally high dosage. This will be

determined by the doctor, preferably after laboratory trial.

Methods of Administration.

Systemic Administration.—It can be given by injection subcutaneously, intravenously or intramuscularly. The intramuscular route is the most of choice, and the continuous-drip method may be employed. It is also given by intrathecal injection.

Local Administration.—It can be given in the form of powder, cream or spray and by soaking gauze in solution. The powder is often mixed with a sulfonamide. It is injected into wound cavities or used for surgical lesions.

Inhalation.—The effect of inhalation is both local and general, because some of the penicillin is absorbed into the blood stream. It is given by means of Collison, Rybar or other inhaler.

Oral Administration.—The drug is rather unstable and some of it is destroyed by acid in the stomach and intestine. It is best given on an empty stomach and must be given in larger doses than when given by injection. Usually five times the dose is necessary. Absorption is more constant in infants and it can be added effectively to a baby's feedings.

To adults it is given in the form of pastilles or lozenges. They should not be chewed, but should be retained in the mouth and be allowed to dissolve there.

For the treatment of **eyes** penicillin drops are used. It is prepared in disc form with gelatine. It is also prepared as an ointment.

Toxic Effects of Penicillin.—Penicillin is a non-toxic. Allergic reactions may be seen but are rarely serious. They include various types of rash, exfoliative dermatitis and urticaria.

Streptomycin.

Streptomycin is obtained from a spore-bearing soil organism, the *Actinomyces griseus*. Unlike penicillin, it is active against many Gram-negative bacteria, and it is both bacteriostatic and bactericidal in action. One feature of the action of streptomycin is that organisms tend to become resistant to the drug. It has been found that when given in conjunction with para-amino salicylic acid (P.A.S.) this does not occur, and so, when streptomycin is given to patients with pulmonary infections, P.A.S. is also given.

Storage.—It must be kept in a cool place.

Use.—It is used in the treatment of influenzal meningitis, in urinary tract infections, in pulmonary infections and in tuberculosis.

Mode of Administration.—It is very poorly absorbed from the intestine and therefore must be given by intramuscular injection. It can also be given intrathecally. It can also be applied locally in ointments and solutions, and is used in the treatment of wounds and burns and for irrigations of cavities such as the bladder. It is excreted in the urine and the active drug can be recovered from the urine.

Toxic Effects.—It is more toxic than penicillin, affecting most particularly the vestibular nerve. It produces headache, pyrexia, vertigo, tinnitus, nausea and vomiting.

Isonicotinyl Hydrazine “Rimifon.”—This is a crystallised tasteless water soluble compound which has proved effective in some cases when given to patients with active pulmonary tuberculosis. It has no toxic effects and the side effects are very mild, chiefly consisting of constipation and dizziness.

The dose is 2 mg. per kilogram of body weight daily. It is given orally in tablet form.

Chloromycetin (Chloramphenicol) has been isolated from *Streptomyces venezuelæ* and can be prepared synthetically. It has been found to be effective against enteric infections, bacillary and urinary infections, in undulant fever, in virus infections, whooping-cough and in venereal diseases. It has no serious toxic effects but it may cause nausea, vomiting and diarrhœa.

Administration.—It is given orally in frequent doses in order to maintain a chemotherapeutic effect. It may also be given per rectum in suppository form and this is particularly useful in infants. It is well absorbed and rapidly metabolised.

Aureomycin, a golden yellow substance, is derived from *Streptomyces aureofaciens*. It is soluble in water and stable in acid solutions. The drug is active against a number of Gram-positive and Gram-negative organisms. It is given orally, by intramuscular injection, and the initial dose by intravenous injection. It is used in virus disease and undulant fever. It is also used in staphylococcal infections, in venereal diseases and urinary tract infections.

Terramycin is an antibiotic drug isolated from *Streptomyces rimosus*. It is readily absorbed after oral administration and affects both Gram-positive and Gram-negative bacteria.

Neomycin is another member of the streptomycin group and may prove to be less toxic and with less tendency to produce resistance. It is more active than streptomycin in tuberculosis and is as active against the streptococcal-resistant strains as against the sensitive strains. It is practically non-toxic.

Tyrothricin is a surface antibiotic used in the treatment of skin infections caused by Gram-positive organisms.

“**Tyroderm**” is a cream containing tyrothricin

VACCINES AND SERA

A vaccine consists of the suspension of a dead organism or an attenuated organism in saline. It is given to an individual to provide him with **active immunity**. The substance injected is not sufficiently virulent to produce the infection, but sufficiently virulent to cause that person to produce in his own blood stream antibodies to that particular infection. The immunity thus produced lasts for varying periods and takes some days or weeks to establish.

An **autogenous vaccine** is one prepared direct from the patient. The organisms are taken from the discharge from the lesion and are cultured and treated and then injected.

A **stock vaccine** is a solution of bacteria obtained from other sources.

Vaccines are used as prophylactic measures against every type of infection with which a person is likely to come in contact and of which the causal organism is known. They are also given for therapeutic purposes in whooping-cough, rheumatoid arthritis and in taphylococcal infection.

B.C.G. (Bacille Calmette Guérin) is used to protect against tuberculosis in persons negative to the Mantoux test.

Antityphoid-paratyphoid vaccine (T.A.B.) is used to protect against the enteric groups of diseases.

Vaccine lymph is used as a prophylactic measure against small-pox. The patient develops cow-pox and produces antibodies which render him immune to small-pox.

Reaction after Vaccine Treatment.—This may show itself in local and general reactions.

Local reactions may be seen as redness, swelling, tenderness and stiffness.

General reactions are fever, headache and general aches.

Serum Therapy.

Serum therapy consists of the administration, to a person infected by some virulent organism, of serum containing antibodies to that particular infection. This constitutes **passive immunity**, and is made use of when the person affected might succumb to the infection before he has time to make for himself his own antibodies.

Serum treatment is also used as a prophylactic measure in cases when a person has come in contact with infection.

The antitoxins given are produced by giving an animal repeatedly small doses of infection until it has stored up in his blood a supply of antibodies. The animal is then bled and the serum treated and used for injection when required.

Sera are usually injected in large bulk, and are given by intramuscular, intravenous, or intraspinal injections. They produce immunity rapidly, but this immunity only lasts for two to three weeks.

Sera are used for the following conditions among many others:

Diphtheria. The dose varies according to the type and severity of disease from 8,000 to 100,000 units.

Staphylococcal and streptococcal infection.

Tetanus. Dose: Prophylactic, 1,000 to 3,000 units; Therapeutic, 20,000 to 50,000 units.

Gas gangrene, anthrax.

Dysentery, typhoid fever.

Meningitis and pneumococcal infections.

Convalescent serum is serum obtained from a convalescent patient. It is used as a prophylactic and therapeutic measure in the treatment of measles and anterior poliomyelitis, though it has proved disappointing in the latter.

Reaction to Serum.—**Serum sickness** is reaction to the giving of any foreign substance, and in its most simple form may be seen in an enema rash. It results after the first injection of any substance, and may occur 8 to 10 days after the injection, or it may occur sooner.

The symptoms of serum sickness are headache, vomiting, urticaria and rise in temperature. The treatment consists of applying local applications to relieve the urticaria and giving adrenaline 1 in 1,000 solution by injection.

Anaphylaxis is a condition in which the patient has become sensitive to some particular protein, and will react if a second injection is given after a period of 10 days. To prevent anaphylaxis occurring, the serum is repeated at 2 to 3 days' intervals. At a subsequent time, if serum has to be given, the patient should first be tested to see if he shows any reaction. If this is positive, he is desensitised to the serum by giving it first in minute doses and then gradually increasing the dose until the whole of the serum has been given.

Symptoms of Anaphylactic Shock.—These are profuse perspiration, a running pulse, rigor, fever, vomiting. There may be incontinence of urine and faeces, dyspnœa, cyanosis and circulatory collapse.

The condition is treated as for a condition of shock and by giving an injection of liquor adrenaline hydrochloride 4 to 8 minims hypodermically, or 5 minims in normal saline by intravenous injection.

Antihistamine Drugs.

Most allergic reactions are due to the release in the tissues of histamine or a substance with a similar action. The allergic reactions include serum sickness, anaphylaxis, hay fever, angio-neurotic oedema, urticaria and asthma.

Antihistamine drugs neutralise the action of released histamine and both prevent and modify the characteristic symptoms. They are believed to act by being absorbed at the point when histamine exerts its characteristic effects. Antihistamine drugs are primarily palliative in their action. The commonly employed are anthisan, antistin, phenerg, benadryl and pyribenzamine. The drugs are prepared in tablets or capsules.

Immunisation against Diphtheria and Scarlet Fever.

The **Schick test** is a subcutaneous test to determine whether an individual is susceptible to diphtheria. 0.2 c.c. Schick test toxin is injected into the right arm, a control test of the same amount of heat-killed toxin being given into the left arm. If the patient shows a positive reaction he should then be immunised to diphtheria.

The substances used may be:

Diphtheria toxin rendered harmless with formaldehyde, called toxoid.

This toxoid may be combined with antitoxin and is called toxoid antitoxin mixture.

Later the floccules or precipitates formed by neutralising toxins or toxoid with antitoxin were used, called toxoid antitoxoid floccules or T.A.F.

Alum toxoid precipitated toxin (A.P.T.).

The number of injections required to bring about immunisation varies. They are usually given two or three times by subcutaneous injection at intervals of two weeks.

The **Dick test**, a test to determine susceptibility to scarlet fever, is similar to the Schick test.

Scarlet fever antitoxin is given both prophylactically

ctically and in the treatment of the illness. The therapeutic dose varies with the severity of the illness, and may be given intramuscularly or intravenously.

Protein Shock Therapy.

The injection of various proteins into the veins or intramuscularly produces severe reaction which in some cases relieves the pain and characteristic symptoms of certain illnesses, as in chronic rheumatism. The substances used are mixed typhoid vaccine, and sometimes whole-milk injections are given. Typhoid vaccine (T.A.B.) is given in the treatment of disseminated sclerosis and many other conditions to produce reaction.

Malaria Therapy.

Malarial therapy is made use of in the treatment of patients suffering from tabes dorsalis and general paralysis of the insane. It is also used for patients with disseminated sclerosis.

The patient is given an intramuscular injection of 10 c.c. of blood obtained from a patient with benign tertian malaria. This produces malaria in the patient, and the patient will consequently suffer from rigors. The temperature and the condition obtained during these rigors is inhibitory to the *Plasmodium falciparum*. After six rigors have occurred the patient must be given quinine to treat the malaria.

Allergic Proteins.

Allergens are extracts of proteins used to prevent and relieve attacks of hay fever, asthma and urticaria, and to discover if the patient is susceptible to these conditions. Intradermal injection of a dilute

solution of various proteins is given to determine susceptibility.

Treatment is given by the avoidance of substances and by desensitising the person to particular protein to which he is sensitive.

Desensitisation is brought about by giving gradually increasing doses of that protein by injection.

Gold Therapy.

Gold salts are used in the treatment of tuberculosis and arthritis. It has also been used in the treatment of lupus erythematosus.

The following preparations are used amongst others:

Sanocrysin: An oily preparation of thiosulphate of gold and sodium.

Solganol.

Myocrysin.

Calcium Aurothiomalate.

The injections are given deep intramuscularly, sometimes intravenously. The action of gold is unknown, and it must be used with very great care. The symptoms of reaction which may occur are shock, rise in temperature, gastro-intestinal disturbances, congestion of mucous membranes. The most serious is acute yellow atrophy of the liver, though this may be due to contamination from infected syringes, and great care should always be taken in sterilisation when a series of injections are given to different patients. The danger of these can be reduced by giving calcium gluconate by mouth daily with liver extract, and in acute cases sodium thiosulphate may be given and calcium gluconate, 10 grains of a 1 per cent. solution, intravenously. Physiotherapeutic measures are combined with the gold injection treatment of arthritis.

The Dose: In one course of injections 1 gramme is given, commencing with a dose of 0.01 gramme and gradually increasing the amount until 1 gramme has been given. A course of injections should be followed by a period of rest of at least three months.

CHAPTER X

LOCAL APPLICATIONS

DRUGS used in local applications may be classified according to their effect. They may be:

Counter-irritants.

Sedatives.

Protectives.

Antiseptics.

COUNTER-IRRITANTS

Counter-irritants cause dilatation of the cutaneous vessels and produce irritation of the sensory nerves. The circulation is stimulated and the lymphatics are stimulated, which promotes the absorption of inflammatory products. They also relieve pain.

They may be divided into the following classes:

1. Rubefacients.

2. Vesicants.

3. Pustulants.

1. **Rubefacients** produce a sensation of heat, and redness is produced in the skin area. The substances used as rubefacients are:

Mustard.

Turpentine.

Antiphlogistine.

Capsicum.

Mustard.—This is applied to the skin in the form of poultices, plasters and a mustard leaf.

Mustard Plaster, or **Cataplasma Sinapis**, is made by mixing equal parts of flour and mustard together into a paste with a little tepid water, spreading this on a piece of brown paper or old linen, covering it with a piece of gauze and applying it to the affected area for 15 to 20 minutes. The application can be

made weaker by adding more flour in proportion to the mustard.

Linseed-and-Mustard Poultice.—Sometimes mustard is added to a linseed poultice to give it a more irritating effect. It is added in the proportion of 1 part of mustard to 8 parts of linseed for an adult and 1 part to 16 for a child. The mustard should be mixed with the dry linseed, or as a safer method it should be mixed to a paste and added to the water into which the linseed is to be added.

A **mustard leaf** is a special preparation of mustard on paper. To apply, the leaf is soaked in water and then applied to the skin surface for 20 minutes.

In every case when mustard is applied to the skin, great care should be taken to prevent blistering. After application should be looked at after 5 to 10 minutes and on its removal the surface of the skin should be smeared with a little warmed olive oil or vasoline. This precaution may be taken before applying mustard-and-linseed poultice.

Turpentine is applied in the form of a stupes. Turpentine to the amount of 1 to 2 drachms is sprinkled on to a piece of old flannel. It is washed out in boiling water and shaken to free it from sediment and applied to the skin for 5 to 20 minutes. On removal the reddened area should be covered with a piece of warm wool.

Turpentine stupes are applied to relieve pain in bronchitis, pleurisy and pneumonia, and to relieve abdominal distension. They should never be applied in cases where there is renal disorder, because turpentine is an irritant to the kidneys, which excrete it.

Kaolin Poultice consists of kaolin (aluminum silicate) with boric acid, methyl salicylate, oil of peppermint and thymol in glycerine.

Antiphlogistine.—This is a patent preparation

colin. It is warmed and applied comfortably hot either directly on to the skin surface or spread on the smooth side of a piece of warmed lint or old linen.

2. **Vesicants.**—These substances produce a rubefacient effect followed by the production of a blister.

Substances used for Blistering Purposes.—Ammonia, acetic acid and chloroform will all produce blisters if their vapour is confined. Lint soaked with the fluids applied to the skin and covered with a watch glass.

Cantharides: Emplastrum Cantharidium.—This substance, obtained from the Spanish fly, is the irritant property contained in blistering plaster or fluid.

The plaster can be obtained especially prepared on a piece of strong linen. The skin is aseptically prepared and the plaster is applied to the area of maximum pain, covered with a piece of lint and removed after 4 to 8 hours.

Blistering Fluid, or Liquor Epispasticus, may be used instead of, and in some cases combined with, the plaster. The fluid is painted over the prepared surface, covered with a piece of sterilised lint and left on for 4 to 8 hours.

Sometimes the fluid contains collodion, and in this case on the removal of the application the area should be swabbed over first with ether to ensure removal of the irritant substance.

The preparation is sometimes obtained in ointment form, which is rubbed over the prepared area.

3. **Pustulants.**—These produce blistering and inflammation of the skin.

Croton Oil rubbed into the surface of the skin or applied on lint will produce pustules.

SEDATIVE APPLICATIONS

Certain applications are applied to the skin for their sedative effect and to relieve pain, and in some cases to reduce inflammation.

Belladonna is used in the following forms:

Belladonna stupe.

Belladonna plaster.

Belladonna Stupe.— $\frac{1}{2}$ to 1 drachm of tincture of belladonna is sprinkled over a piece of flannel which has previously been wrung out in boiling water and applied to the skin.

Sometimes glycerine of belladonna may be painted over the skin surface and a medical fomentation may be applied over this. Sometimes the belladonna may be painted over the skin surface with no further application.

Belladonna Plaster.—Belladonna may also be applied in plaster form. It is warmed and applied directly to the skin surface and left on for 2 to 3 hours. The application of heat over the plaster enhances its action. Before applying the plaster, tiny incisions should be cut in the surface to prevent too rapid absorption of the belladonna. In whatever form belladonna may be applied, care should be taken to watch the patient for symptoms of belladonna poisoning.

Opium.—This drug is applied in a similar way to belladonna stupe, $\frac{1}{2}$ to 1 drachm of the tincture being sprinkled over the surface of a piece of flannel which has previously been wrung out in boiling water.

Lead.—Lead lotion, or lotio plumbi, is used as an evaporating lotion to relieve pain and reduce inflammation. Lotio evaporans contains methyl spirit with lotio plumbi.

Acetyl Salicylic Acid (Aspirin).—This is used in the form of powders and emulsions. Aspirin powder is dusted over skin surfaces to relieve pain in the condition of varicose veins.

It is used in the form of emulsion and powder in tablet form to relieve pain in the throat.

Cocaine hydrochloride, $\frac{1}{4}$ gr., is given in suppository form to relieve pain in hæmorrhoids, and is used for its surface anæsthetic effect in nose and throat surgery. Cocaine lozenges contain $\frac{1}{80}$ to $\frac{1}{2}$ gr.

Liniments are liquid or soft preparations of drugs applied by rubbing into the skin or applying by means of lint or flannel. The drug is dissolved in alcohol or some oily substance.

Methyl Salicylate (Wintergreen).—This is a rubefacient and anodyne, and is used with olive oil specifically in the treatment of rheumatism.

The ointment containing lanoline may be used instead.

Camphorated Oil (Linimentum Camphoræ).—Camphor 20 per cent. in olive oil is a weak antiseptic and rubefacient, and acts as a local anodyne; it is used for sprains, lumbago, neuralgia and chest conditions.

PROTECTIVES AND EMOLLIENTS

Protectives are substances used to protect the skin or mucous membrane from irritation and infection. They form a superficial covering.

Collodion.—Collodion flexile contains Canada turpentine and castor oil.

Styptic collodion contains 20 per cent. tannic acid.

Paraffin is used often as a local application in the form of wax. It coats the affected area with a fine film, thus excluding the air.

Olive Oil is obtained from the olive. It is both protective and emollient in its action when applied to burns caused by corrosive acids and alkalis. When given by means of inunction to babies, the oil is absorbed by the lymphatics, and it prevents the loss of heat.

Powders.—Certain powders also act as protectants. These include:

Bismuth subgallate, or dermatol, which is an antiseptic dusting powder.

Fuller's earth, which is a preparation of kaolin.

Starch is protective and absorbent in its action and is a common basis for dusting powders with boric and talc.

Emollients are oily substances used to soften the skin and mucous membrane, and used as vehicles in which to carry medicinal substances. They usually take the form of ointments and liniments. Lard and lanoline are the main fatty bases used for ointments.

Lard is obtained from the internal fat of the pig's abdomen.

Lanoline is purified fat obtained from sheep's wool.

Paraffin, obtained from petroleum, is also used as a base.

Vaseline is yellow soft paraffin.

Soft Soap is both an emollient and cleansing agent.

Ethereal soap is soft soap combined with alcohol and ether and used as an antiseptic agent in surgery.

Glycerine is both protective and emollient to the skin. It exerts a slight irritating effect owing to its hygroscopic action. Internally glycerine is a cathartic and a demulcent. It is used frequently for cleansing of the mouth combined with borax. It is used as a solvent for antiseptics and assists in the penetration of drugs, so it is used combined with antiseptic drugs, as ichthyol, for relieving inflammatory conditions, and as a vaginal application for relieving chronic discharge.

ANTISEPTICS

Antiseptics arrest the growth of organisms. Disinfectants kill the organisms.

LOCAL APPLICATIONS

PHENOLS AND ALLIED SUBSTANCES

Carbolic acid (phenol), obtained by distilling coal tar

5 per cent. solution

Pure carbolic

Glycerine and carbolic
Trochiscus phenolis

Cresol, chemically related to carbolic acid, obtained from coal tar

Lysol (coal-tar preparation)

Creosote, obtained from distillation of beech tar

Chlorinated Xylenol (Dettol)

Picric acid (trinitrophenol)

HALOGENS

Chlorine, obtained from sea salt (hypochlorous acid)

Iodine obtained from ashes of seaweed

Contained in many proprietary preparations, as cyllin, izal, Jeyes' fluid, monsol

1 in 160

Unguentum creosote

Varying strength

2 per cent. in alcohol

Liquor sodæ chlorinatæ. "Dakin's solution." Eusol, calx chlorinatæ, with boric acid

Chloramine T

Liquor iodi fortis 10 per cent. iodine and 6 per cent. potassium iodide in 90 per cent. solution of alcohol and water

Disinfection of excreta and ward equipment.

Cauterising boils.

Drops for ears.

Used for throats and mouth-washes.

Tablets, which may be used as antiseptics in septic condition of throat.

Very powerful antiseptic. Used for septic wounds and vaginal douches.

Vaginal douches. Septic wounds.

Powerful antiseptic used for skin conditions.

Used for surgical dressing and vaginal irrigation.

Applied locally to skin as cleansing agent.

Used for irrigation of wounds.

Urethral and vaginal irrigation.

Used to cleanse skin surgically in preparation for surgical procedures.

Employed as weak mouth-wash and painted on gums.

<i>Name of Antiseptic.</i>	<i>Forms used and Strength.</i>	<i>Purpose.</i>
Iodoform (compound of iodine with methane)	Powder form. Ointment form. Suppository. Bismuth, iodoform and paraffin (Bipp). Aristol (preparation containing iodoform)	Liberates iodine when in contact with warmth and moisture; by absorbing fluid from wounds it prevents growth of bacteria. Antiseptic dusting powder for wounds.
OXIDISING AND REDUCING AGENTS		
Hydrogen peroxide (chemical compound of equivalent parts of hydrogen and oxygen)	10 to 20 volumes	Becomes decomposed on contact with organic matter and gives off oxygen. Used for irrigation of wounds and as a mouth-wash. For treatment of burns.
Potassium permanganate (salts of manganese)	1 per cent. in water	Cleansing offensive wounds. Vaginal and urethral irrigation. Mouth-wash.
Formaldehyde Liquor	1 in 5,000 to 1 in 10,000 Solution of, contains formalin 40 per cent.	Very powerful antiseptic toxic to bacteria. Used as skin preparation.
ACIDS		
Boric acid	Lotion 4 per cent. Ung. boracic. 10 per cent. in paraffin molle. Pulv. boracic	Weak antiseptic for irrigation of cavities. Irrigation of eyes and nasal and aural passages. Gastric lavage. Mouth-washes.
ALCOHOL	Glycerinum acidi boraci	
Alcohol	50 to 70 per cent.	Most powerful antiseptic. Used as

<p>curic chloride or corrosive sublimate) Biniodide of mercury Oxycyanide of mercury Mercurochrome</p>	<p>1 in 1,000 to 10,000 1 in 500 1 in 5,000 to 1 in 10,000 1 to 2 per cent.</p>	<p>irrigation of eyes. Vaginal douche followed by douche of boracic. Disinfection of excreta. For cleansing skin surgically. Bladder irrigation. Eye irrigation. Bladder irrigation. Used for staphylococcal and gonococcal infections. Antiseptic dusting powder for septic ulcers and skin conditions. For inunctions. Used for inflamed joints, sprains and in treatment for tuberculous peritonitis.</p>
<p>Insoluble salts of mercury</p>	<p>Calomel powder Mercurial ointments Scott's dressing, or unguentum hydragryri compositum, contains mercury ointment 40 per cent. with olive oil and camphor</p>	<p>Used as antiseptics for irrigation of urethra and bladder.</p>
<p>Silver preparations: Argyrol Collargol Protargol</p>	<p>Compounds of silver oxides and proteins</p>	<p>Dressing of wounds. Gonococcal infection. Used for wounds. Used for wounds; may also be used in powder form. Used for skin.</p>
<p>ACRIDINE ANTISEPTICS Acriflavine</p>	<p>Lotion 1 in 1,000 in normal saline Emulsion in liquid paraffin 1 in 1,000 solution in water or saline 1 in 2,500 solution 1 in 500 in 50 per cent. spirit</p>	<p>Strong antiseptic. Used for treatment of skin sepsis and for painting mucous surfaces such as the mouth.</p>
<p>Proflavine sulphate Flavazole (Proflavine with sulphathiazole) Acramine</p>	<p>DYES Gentian violet, brilliant green (organic dye made from coal tar)</p>	

<i>Name of Antiseptic.</i>	<i>Forms used and Strength.</i>	<i>Purpose.</i>
DETERGENTS AND OTHER SUBSTANCES Cetrimide (CTAB) (Cetyltrimethylammonium bromide)	1 per cent. solution	Detergent used for cleansing skin, hands, wounds and bruises. It is non-irritating to raw surfaces. Used for skin conditions.
Ichthylol (ammonium ichthosulphonate), substance obtained from a bituminous mineral formed as deposits of fossil fish	Ointment 10 per cent. Paste	
Milton (electrolytic solution of sodium hypochlorite)	2 per cent.	Irrigation of wounds and burns.
Trichlorophenylmethyliodo-salicyl (T.C.P.)	25 per cent. solution 25 per cent. solution	Used for treatment of wounds. Gargle and mouthwash.
Saline solution	2 to 5 per cent., hypertonic solution	Exerts antiseptic effect; used for wounds.
Aminacrinæ hydrochloridum	1 : 1,000 to 1 : 2,500	Antiseptic used for irrigation of wounds and eyes, and in dentistry.

N.B.—Normal saline solution, strength 0.9 per cent. sodium chloride (80 gr. to 1 pint) is not an antiseptic.

Antiseptics may be applied in the form of:

Ointments.

Powders.

Lotions.

They may be divided into the following groups:

Phenols and allied substances.

Halogens.

Oxidising and reducing agents.

Acids and alkalis.

Alcohol.

Metallic substances.

Acridine antiseptics.

Dyes.

Detergents and other substances.

DEODORANTS

A deodorant is a drug which masks or destroys an unpleasant odour.

Potassium permanganate and hydrogen peroxide, by oxidising the products of decomposition, act as deodorants.

Solutions of sodium hypochlorite and phenol compounds are frequently used.

Charcoal is used, and is given in the form of biscuits, or it may be applied in the form of a charcoal poultice to mask the odour which emanates from an offensive ulcerating wound.

ASTRINGENTS

Astringents cause contraction of tissue and lessen secretion from mucous membranes.

Alum is both astringent and hæmostatic in its effect. It is used to check bleeding. Solutions of alum are used in mouth-washes for treatment of inflamed gums.

Copper Sulphate is used in powder form and as blue cone to warts, ulcers and granulations.

Ferrum (Iron).—Liquor ferric perchloride has astringent effect on wounds and mucous surfaces. It is used in treatment of conditions where there is a chronic discharge.

Lead.—Salts of lead are powerful astringents, reduce inflammation and promote healing. Glycerine may be combined with lead.

Potassium Chlorate.—A white crystalline powder used in mouth-washes and gargles for its astringent effect (4 to 6 per cent. solution). It may also be used in tablet form for conditions of the throat.

Silver Nitrate is used as a caustic to check excessive granulations from wounds.

Tannic Acid.—An organic acid obtained from gall, a vegetable substance produced in the bark of the oak tree. It is applied locally to wounds, ulcers and bleeding surfaces in the form of lotions, powders and ointments. When applied to the skin, it contracts the tissue by coagulation and hardening of cells. It is used internally to check secretion from the mucous membrane. It is used extensively in the treatment of burns, sometimes being combined with an antiseptic, as acriflavine or perchloride of mercury.

It is used in ointment and suppository form in the treatment of hæmorrhoids.

Galla is composed from tannic acid and gallic acid. It is sometimes combined with opium in gall-and-opium ointment for application to hæmorrhoids.

Hamamelidis, or Witch-Hazel, is obtained from the bark and twigs of an American plant. It contains tannic acid and a volatile oil. It is used to lessen secretion from mucous membranes and is applied in the treatment of hæmorrhoids.

Zinc Salts.—Zinc sulphate, $\frac{1}{2}$ to 1 per cent. solution is used to limit discharge from wounds. It is also used in ointment form.

DRUGS USED IN THE TREATMENT OF SKIN DISORDERS

Drugs used for skin diseases may be divided into those which are used externally, in the form of ointments, pastes and powders, and those which are given internally.

Drugs used for External Applications.

Powders are used as astringents and absorbents, and for their sedative effect, being chiefly applied for erythematous conditions.

The chief powders used are:

Boric acid.

Magnesium silicate, french chalk or talc.

Bismuth.

Calomel.

Zinc oxide and starch.

Ointments contain various ingredients incorporated in a soft base, as paraffin, vaseline and lanoline. They are impermeable to cutaneous perspiration and are used for the effects of the medicinal substance contained in them on the particular local lesion.

Cold creams are ointments combined with water, which by its evaporation produces a cooling effect.

Some of the substances used in ointments are zinc oxide, ammoniated mercury, ichthyol and salicylic acid. Emulsifying bases are used to aid the removal of ointments, particularly from the scalp.

Unguentum dithranol (cignolin) is used for the treatment of psoriasis and ringworm. Lassar's paste with dithranol is used also.

Pastes are mixtures of an ointment base with powder, with the volume of powder predominating. They are porous and are permeable to perspiration, and soften and protect the skin surfaces to which they are applied. The powder absorbs the exudate from the lesion.

Pastes commonly used:

Lassar's Paste.

Zinc oxide.
Starch.
Lanoline or paraffin.
Salicylic acid.

White's Paste.

Coal tar.
Zinc oxide.
Paraffin.

Unna's Paste.

Zinc.
Gelatine.
Glycerine.
Water.

Liniments.—These are liquid ointments, composed of soapy or oily preparations containing drugs which are applied to the skin.

Linimentum calaminæ is the most frequently used. It commonly contains:

Calamine.
Zinc oxide.
Lime water.
Arachis oil.

Lotions.—These are more commonly employed where large areas have to be treated. They may be divided into:

Astringent lotions containing salts of zinc and copper sulphate, silver nitrate or alum.

Antiseptic lotions containing iodine, boracic carbolic, formalin or ichthyol.

Antipruritic lotion containing tar, mercury, carbolic salicylic acid.

Calamine lotion contains:

Calamine.
Zinc oxide.
Glycerine.
Lime water.

Pigments.—Brilliant green, which is applied painted over the skin surface, is used as an antiseptic and stringent in treatment of ringworm, and in many other skin conditions.

A paint of malachite green commonly contains:

Hydrarg. perchlor.

Brilliant green.

Alcohol.

Baths.—Baths are given for their emollient effect in the treatment of certain skin disorders, which include psoriasis, eczema and other inflammatory skin conditions. Baths given for the treatment of eczema:

Bran: 2 to 4 lb. in 30 gallons of water at a temperature of 90° to 100° F.

Starch: $\frac{1}{2}$ to 2 lb. mixed to a smooth paste and then added to a 30-gallon bath.

Oatmeal: 2 to 4 lb. in 30 gallons.

Alkaline Baths.—These have a sedative effect, and they are also given because they are solvents of epidermis, and so are given in chronic conditions to remove scaly epidermis. They also have a stimulating effect on the glands.

Substances used:

carbonate of potash $\frac{1}{2}$ to 2 oz.	} in 30-gallon bath
sodium carbonate 2 to 6 oz.	
sodium bicarbonate 5 to 10 oz.	
	} at temperature of
	} 100° F.

Antiseptic Baths are used for parasitic infections of the skin, as scabies, and other conditions, as porrhoëa and psoriasis.

Sulphur Baths.—Sulphurated potash 8 oz. in 30-gallon bath. These are now rarely used, as they may cause dermatitis because of their irritant effect.

Lysol: 1 drachm to a gallon.

Tar baths: 6 oz. liquor picis carbonatis in 30 gallons; used chiefly for psoriasis.

Other applications used in treatment: S
poultices with boracic are employed to soften
before the application of ointments and lotion i
treatment of impetigo.

Tonics are also given in skin disorders and inc

Arsenic.

Strychnine.

Potassium iodide.

Salicylates are used when the lesion is of rheu
origin.

Sedatives are given, the chief being luminal
twice a day.

DRUGS USED IN PARASITIC CONDITIONS OF THE S

For the Treatment of Pediculi Capitis.

Sassafras, obtained from the root and bark of
Sassafras officinale. Oil of sassafras is used
parasiticide. It should be rubbed into the ha
used as a compress and be left on the head
12 hours.

Derris præparata.—Derris powder contains
none.

Rotenone, 1 to 2 per cent., is used as an oint
or lotion, and is massaged into the scalp. It sh
be left on for 10 days, after which time the
should be washed.

Thiocyanate.

Lethane 384 (Special) contains organic thiocyan
with refined paraffin. It is lethal to lice and to
nits, and is applied in the same manner as roten
The hair should not be washed for a week after
application.

Dichlordiphenyltrichlorethane (DDT) is a w
crystalline solid with a faint pleasant smell. I

insoluble in water. It has marked insecticide properties, and has been used for the treatment of lice, bed bugs, mosquitoes, horse flies and other pests.

Methods of Application.

1. In powder form. The clothes of the infested person are sprayed with the powder, using about 1 per cent. of the weight of the garment. The powder remains in the garment for a period of 1 month in spite of laundering.

2. As a solution in organic solvents or as a dispersion in water, or dissolved in oil emulsified. The emulsion is useful in the treatment of head lice, because it persists and kills the nits.

DDT has proved invaluable in the control of epidemics of typhus fever, and it has made possible more economically the control of malaria in infested areas.

Aphtiria 666 or Gammexane is another insecticide which is useful in the treatment of scabies and the head louse.

For the Treatment of Scabies.

Sulphur ointment is rubbed into the skin after the skin has been well scrubbed with soap and water. This is applied for three days, after which time it may prove irritating, producing dermatitis.

Benzyl benzoate emulsion or cream. The patient is lathered with soft soap and should soak in a bath for 10 minutes. He should be allowed to dry or be dried lightly, and then the emulsion should be painted on, using a stiff brush. The application should be continued on for 48 hours before a bath is given again.

Tetraethylthiuram monosulphide (TEMS) has been used in a 5 per cent. solution and proved to be effective. It has also been produced as Tetmosol soap and used with success.

For Treatment of Ringworm of the Scalp.

Epilation may be effected by the application of a very carefully regulated dose of X-ray or by the use of thallium acetate.

Thallium acetate is used specifically for the treatment of ringworm of scalp in children under 6 years of age. It is given as a depilatory, and must be used with the utmost care because it readily produces toxic symptoms. The dose is regulated according to body weight, being 4 mg. per pound of body weight. It must never be repeated. It is used in conjunction with liquor iodi mitis, which is painted over the whole head three times a day.

DRUGS USED IN THE TREATMENT OF EYE DISEASES

Drugs are applied in the form of drops, lotions, ointments, pigments and solid preparations in the treatment of eye diseases.

1. Drops (*Guttæ*).

Drops are instilled for the local action of the drug in solution. They are used in small quantities only, 1 or 2 drops being instilled into each eye at a time.

Drops are instilled for various reasons—as mydriatics, myotics, antiseptics, and as local anæsthetics.

A **mydriatic** is a drug which dilates the pupil. The substances chiefly used are:

Atropine sulphate, $\frac{1}{2}$ to 1 per cent., used in cases of iritis, keratitis, and for injuries of the cornea and the globe; it may be used after operation.

Hyoscine hydrobromide (Scopolamine), $\frac{1}{2}$ to 1 per cent. solution.

Duboisine, $\frac{1}{4}$ per cent. solution, used for cases where patients show intolerance to atropine.

Homatropine hydrobromide, 1 to 2 per cent.

Homatropine and **cocaine** in 2 per cent. solution are used for dilating the pupil, especially for an examination of the fundus. It has a weak cycloplegic action. **Eserine** $\frac{1}{2}$ per cent. in oil is used to counteract it.

Lævo-glauco-san, 2 per cent. solution, containing **adrenaline**.

Mydracaine (cocaine, **adrenaline** and **atropine**), minimis, is used for subconjunctival injection.

Lachesine 1 per cent. is non-irritating.

A **cycloplegic** is a drug which paralyzes accommodation of the eye and is used for purposes of estimating refraction. Many of the mydriatics used are also cycloplegic in action, as **atropine**, **homatropine**, **scopolamine** and **duboisine**.

A **myotic** is a drug which causes the pupil to contract.

Drugs used for this purpose are:

Physostigmine (**eserine sulphate**), $\frac{1}{4}$ to 1 per cent. solution of a watery solution. This drug is used chiefly to counteract the effect of a mydriatic or to contract the pupil in glaucoma.

Pilocarpine nitrate, 1 to 2 per cent. solution, is used over a long period in glaucoma. It is less irritating than **eserine**.

Di-isopropyl fluorophosphate (**D.F.P.**), 0.05 per cent. to 0.1 per cent., in aqueous solution or peanut oil, is used when the lens is absent.

Carbachol 1.5 per cent. with **Zephiran** 0.02 per cent. in glaucoma.

Drugs given by Instillation for their Antiseptic Effect.

Copper sulphate, 0.4 per cent. solution, is used in the treatment of trachoma.

Zinc chloride, 0.2 per cent., and **Zinc sulphate**,

$\frac{1}{2}$ per cent. These are used in the treatment of angular conjunctivitis. They are also astringents.

Mercurochrome, 1 to 2 per cent. solution, is often used as an antiseptic.

Albucid, 10 to 30 per cent., for gonococcal infections and injuries of eye, and for conjunctivitis.

Penicillin and **Cortisone** are used for conjunctivitis and for infections of the cornea.

Drops used for the Treatment of Burns and Injuries.

"Dionine" (**Ethylmorphine hydrochloride**), 1 per cent., used for keratitis and corneal ulcers.

Drugs given as Local Anæsthetics by Instillation.

Cocaine hydrochloride, 4 to 5 per cent., instilled into the eye.

Butyn 0.5 per cent. or **Pantocain** may be used as an alternative to cocaine for the removal of a foreign body from the eye.

Procaine 4 per cent. is used for subconjunctival and retrobulbar anæsthesia.

Holocaine hydrochloride, 1 per cent., is used in cases of glaucoma and when a foreign body has been removed.

2. Lotions.

Lotions are used for cleansing and antiseptic purposes. They are used in weak solutions, because strong antiseptics may injure the tissues of the eye.

Boracic lotion, 300 gr. to 1 pint or 4 per cent. solution and diluted to half strength for use. It is a mild antiseptic and is used for irrigation in cases of conjunctivitis.

Zinc chloride and **Zinc sulphate**, 0.4 per cent. are used in treatment of angular conjunctivitis.

Mercurial Substances.—**Perchloride of mercury** (mercuric chloride or corrosive sublimate), 1 in 10,000 and 1 in 20,000.

Mercury oxycyanide, 1 in 8,000.

These mercurial preparations are used in cases of purulent and muco-purulent conjunctivitis.

Normal saline is used for its mechanical effect alone.

3. Ointments (Oculenta).

Ointments are applied either to the lid margins, as in the treatment of blepharitis, or they may be placed in the conjunctival fornices for the effect of the absorbed drug on the eye itself. They are also applied to prevent the eyelids sticking together and to prevent the lid from becoming adherent to the globe.

Zinc oxide is applied in cases of irritation of lids due to atropine poisoning. It is an astringent ointment.

Atropine ointment, 1 per cent., is used in cases of keratitis, iritis, and for wounds of the cornea and the globe.

Hyoscine, $\frac{1}{2}$ to 1 per cent., is sometimes used instead of atropine when atropine causes irritation.

Vaseline and **boracic ointments** are used to prevent the lids sticking together.

Yellow oxide of mercury, 1 to 2 per cent., is an antiseptic ointment used for treatment of blepharitis, conjunctivitis and keratitis.

Ammoniated mercury, 1 per cent., is used for conditions of blepharitis.

Penicillin ointment is used for blepharitis and conjunctivitis.

Cortisone ointment is used in the treatment of iritis and corneal ulcer.

4. Solid Substances.

Lamellæ.—These are tiny discs of gelatine are used instead of drops and ointments and contain the following substances:

Cocaine, atropine, hyoscine, homatropine, tropine with cocaine and penicillin. They are convenient form for carrying about and are in just inside the lower lid.

Blue stone or copper sulphate is used for the treatment of trachoma.

Albucid powder is applied in the treatment of hypopyon ulcer after the instillation of cocaine 1 per cent.

Solid cocaine is used for deep anæsthesia of the conjunctiva.

5. Pigments.

Silver nitrate, 2 per cent., is used for painting the conjunctiva in cases of chronic conjunctivitis.

For Staining an Eye.—**Fluorescein**, 1 to 2 per cent. solution, by instillation, is used to stain the cornea and conjunctiva so that their condition may be more easily seen.

DRUGS USED IN THE TREATMENT OF BLEPHARITIS

Lotio Sodii Bicarbonatis, 3 per cent. solution.

Oculentum penicillini, 1,000 i.u. per gramme.

Hydrargyrum ammoniatum, dil. 2 per cent.

DRUGS USED LOCALLY FOR INFLAMMATORY CONDITIONS OF THE THROAT

In some cases of inflammatory conditions of the throat it is necessary to rely on local application in the form of gargles, lozenges and paints.

Gargles.—The drugs included in gargles are:

Thymol.
Glycerine.
Phenol.
Tannic acid.
Aspirin.
Potassium chlorate.

Lozenges are given to suck in conditions of sore throat, and may include:

Tab. formaldehyde.
Penicillin.
Phenol.

Paints.—The most popular of the paints used is Pigmentum Iodi Co., or Mandl's paint, which contains iodine, potassium iodide, glycerine, water and oil of peppermint.

CHAPTER XI

POISONS

Poisons are substances which cause injury to tissue and destroy life. The injurious effect may be either local or general.

Local effects vary according to the site of the injury. The skin is irritated or destroyed, producing areas of dead tissue. There may be swelling. In the mucous membrane of the mouth and gastrointestinal tract there will be irritation resulting in pain, vomiting of blood and shreds of mucous membrane, and diarrhœa. All these symptoms will be accompanied by collapse.

General Effects.—These will produce symptoms depending upon the particular poison taken. Some will affect particularly the respiratory system, whilst others may affect especially the heart, circulation and blood. Others may stimulate the nervous system, producing convulsions, whilst in others the kidney may be the particular organ affected.

Poisons are divided into five classes:

1. **Corrosive Poisons.**—These are substances which destroy tissue and take the form usually of strong acids and alkalis. Phenolic disinfectants will be included in this class. They are corrosives but are not strong acids.

2. **Irritant Poisons.**—These affect the intestinal tract and produce pain, vomiting and purging.

3. **Narcotics**, which act on the nervous system, producing stupor.

4. **Deliriants**, which produce excitement and convulsions.

5. **Convulsants**, which produce convulsions.

General Principles in Treatment.

1. Send for medical aid, and save for inspection any vomitus, excreta and contents of bottles which may be found.
2. Empty the stomach either by means of an emetic or stomach tube.
3. Relieve pain and prevent absorption by giving demulcents.
4. In every case the patient must be treated for shock by the application of warmth and general stimulants.

N.B.—No emetic must be given nor should a stomach tube be passed in cases of corrosive poisons because of the danger of causing perforation of the stomach and the œsophagus. When the nature of the poison taken is known, the suitable antidote should be given.

Antidotes are substances which neutralise a poison or its effect. They may be either:

Chemical or
Physiological.

Chemical antidotes are those substances which combine chemically with a poison and neutralise it by forming a new compound which is not injurious and which is not absorbed—*e.g.*, acids will neutralise alkalis, because they form chemical compounds with each other.

Precipitates.—Some poisons may be neutralised by substances which cause their precipitation. They form an insoluble compound with the poison which is not absorbed—*e.g.*, potassium permanganate.

Physiological antidotes are substances which produce effects opposite to those of the poison and neutralise its effects.

Emetics used in the treatment of poisons:

Mustard and water: dose 1 tablespoon in a tumbler of water.

Salt and water: dose 2 tablespoons in a tumbler of water.

Apomorphine: dose $\frac{1}{6}$ gr. by hypodermic injection.

Zinc sulphate: dose 30 gr. in half tumbler of water.

Epsom salts: dose 2 drachms in a tumbler of water.

Tinctura ipecacuanhæ: dose $\frac{1}{2}$ to 1 fl. ounce.

Stimulants.—Sal volatile (aromatic spirit of ammonia): dose 1 drachm in water.

Strong coffee or tea.

Strychnine hydrochloride: dose $\frac{1}{30}$ gr. by hypodermic injection.

Coramine: dose $\frac{1}{2}$ to 1 c.c. by injection.

Cardiazol: dose 15 to 45 minims by injection.

Alcohol should not be given unless especially ordered, because, being itself readily absorbed, it may aid in the absorption of the poison.

Demulcents.—Milk, raw egg, starch, water, arrow-root, gruel, olive oil and medicinal paraffin.

For list of poisons and treatment see overleaf.

Note.—In all cases of poisoning by acids and alkalis the neutralising agents, when given, should be given in small doses, to prevent the unpleasant effect of effervescence which will ensue if they are given in large quantities.

<i>Poison.</i>	<i>Symptoms.</i>	<i>Antidote and Treatment.</i>
Corrosives—Strong acids: Acetic acid (strong vinegar)	Characteristic odour of vinegar. White stains in mouth and oesophagus	Water given to dilute acid. Alkalis, as whiting, chalk, plaster.
Carbolic acid (phenol)	Characteristic odour. Burning pain in mouth and throat. Mouth and lips stained white. Excessive salivation. Increased pulse and respiration. Faintness, giddiness, collapse, followed by coma. Carboluria.	Sodium or magnesium sulphate, $\frac{1}{2}$ oz. in 1 pint of water. Stomach lavage with antidote. Demulcents given, as olive oil, medicinal paraffin, milk, albumen, water. Artificial respiration if required.
Hydrochloric acid (spirits of salt)	Characteristic odour. White coating on lips and tongue. Skin round lips blistered with white scar	Sodium bicarbonate, 4 tablespoons in 1 pint water. Later give demulcents.
Nitric acid (aqua fortis)	Yellow stains. All other symptoms of corrosive poison	Lime water. Chalk plaster followed by demulcents.
Oxalic acid (salts of lemon)	Mouth stained white. Vomiting of dark fluid	Magnesium oxide or magnesium carbonate, 4 tablespoons in 1 pint water. Stomach lavage. Lime water or chalk or whiting given.
Sulphuric acid (oil of vitriol)	Black stains on tongue. Dark brown or black vomit mixed with blood	Sodium carbonate (washing soda). Dilute with water to which alkalis are added. Later give demulcents.
Lysol	Symptoms appear slowly. Patient	Magnesium sulphate.

Strong ammonia

Irritant Poisons:

Antimony (tartar emetic)

Arsenic

Copper sulphate

Iodine

Lead

Mercury (corrosive sublimate, perchloride of mercury)

purging and suffocation. The lips and cheeks are burnt and the tongue has the appearance of raw beef. There is collapse

—

Vomiting and salivation, with metallic taste in mouth. Abdominal pain and diarrhoea

Nausea and vomiting. Cramp-like pains in stomach. Severe shock and cerebral symptoms. Diarrhoea

Vomiting and dryness of throat.

Metallic taste in mouth

Nausea and vomiting and extreme thirst. Vomit may be yellow or blue in colour. Severe pain in mouth and stomach

Dry mouth, with pain of burning nature. Metallic taste in mouth. Blue line round gums. Cramp-like pain in muscle and intestine, neuritis and wrist drop. Cerebral symptoms

Soreness and swelling of gums. Unpleasant metallic taste in mouth and dryness of throat. Vomiting, diarrhoea, pain and collapse

followed by demulcents, as olive oil and milk. Morphine may be given to treat condition of shock and pain. Strychnine may be given as a stimulant. Emetics and stomach lavage should not be given.

As above, but in addition a steam kettle may be necessary, due to irritating effect of ammonia on respiratory tract.

Emetic, stomach lavage with tea or tannic acid. Demulcents and stimulants.

Treat for shock. Emetic or stomach lavage. Carbonate of magnesia in water, or ferric hydrate with ferric perchloride. Stimulants. Sodium thiosulphate 0.9 per cent. may be given intravenously.

Emetic if needed. Stomach lavage.

Milk and eggs. Purgative.

Starch and water diluted with water.

Lavage with magnesium sulphate to form lead sulphate. Epsom salts given in small doses. Heat applied to abdomen. A course of Dimercapto! (B.A.L.) causes excretion of lead in the urine.

Stomach lavage. Albumen water followed by emetic, and then further doses of albumen water.

<i>Poison.</i>	<i>Symptoms.</i>	<i>Antidote and Treatment.</i>
Silver nitrate	Blue line round gums. Dusky appearance of skin	Sodium chloride 2 drachms in 6 oz. water as antidote.
Phosphorus	Nausea, vomiting. Breath smells of garlic. Burning sensation in throat. Extreme shock and unconsciousness. Later symptoms of acute yellow atrophy of liver	Treat for shock. Emetic. Copper sulphate 3 gr. to 4 ozs., followed by Epsom salts. Stomach lavage with potassium permanganate. No oils must be given because phosphorus is soluble in oil, therefore would become more readily absorbed. Antidote salt, 1 tablespoon in tumbler of water. Albumen water in large quantities. Sodium bicarbonate and potassium carbonate in water.
Zinc salts	—	
Narcotics: Aspirin	Dyspnoea, perspiration, vomiting, prostration, weak pulse, coma, collapse.	Stomach lavage. Sodium bicarbonate solution, 5 per cent.
Chloral	Sleepiness, coma, insensibility. Circulation affected	Emetic, stomach lavage. Keep awake, apply artificial respiration. Inhalation of carbondioxide and oxygen. Strychnine $\frac{1}{10}$ gr.
Chloroform	Depression of cardio-respiratory and vasomotor centres	Artificial respiration. Carbon dioxide and oxygen inhalations. Strychnine, atropine and adrenalin given. Bicarbonate of soda. Stomach lav-
Cocaine	Respiratory and cardiac failure. Pallor and clammy skin.	

Opium, morphine and their derivatives, laudanum, chlorodyne

Alcohol, methylated spirit, eau de Cologne

Deliriants:

Aconite (monk's-hood plant) (Found in A.B.C. liniment)

Belladonna, atropine (deadly nightshade)

Convulsants:

Prussic acid (hydrocyanic acid)

Strychnine

Suppression of urine
Slow, feeble and fluttering pulse.
Respirations slow and shallow, becoming deep and stertorous. Skin pallid. Cyanosis. Pin-point pupils. Drowsiness and stupor

Characteristic odour. Face flushed. Pupils dilated. Excitement followed by coma. Vomiting

Tingling of lips. Burning pain in throat and stomach. Dyspnoea and heart failure
Excitement. Face flushed. Rash. Dry, sore throat. Pupils dilated. Delirium. Coma

Pulse feeble, respiration slow and irregular, sighing and gasping in character. Breath smells of bitter almonds. Insensibility followed by coma. Pupils dilated with fixed staring eyes

Restlessness. Tetanic convulsions. Livid features. Difficulty in breathing. Collapse

Emetic or lavage of stomach. Potassium permanganate 10 gr. in 6 oz. water. Artificial respiration. Oxygen and carbon dioxide inhalations. Atropine $\frac{1}{16}$ gr. Strychnine. Strong coffee per rectum.

Emetic or stomach lavage. Apomorphine. Strong coffee. Cold effusions to face and head.

Emetic. Coffee. Sedatives. Artificial respiration. Stomach lavage with tannic acid or tea.

Emetic. Coffee. Artificial respiration. Pilocarpine $\frac{1}{4}$ gr. by hypodermic injection. Stomach lavage with tannic acid 20 gr. in water.

Ferrousulphate 10 gr., with $\frac{1}{4}$ drachm tincture ferric chloride and 1 oz. water. Emetic apomorphine $\frac{1}{16}$ gr. Stomach lavage with potassium permanganate. Artificial respiration and effusion of cold water to head and spine. Ammonia inhalations. Emetic or stomach lavage of potassium permanganate. Keep patient quiet. Give fluids. Chloroform to check spasms. Artificial respiration. Sedatives.

CHAPTER XII

DRUGS USED IN RADIOGRAPHY AND FOR SPECIAL TESTS

RADIOGRAPHY OF THE ALIMENTARY TRACT

OPAQUE meals are given for examination of the alimentary tract.

Barium Meal.—2 to 5 oz. of barium sulphate were formerly used in 5 to 15 oz. of some cornflour preparation as a thickening agent. Now it is customary to omit the cornflour and use a barium emulsion. In a barium emulsion pulv. tragacanth may be used as the suspending agent and vanilla is used for flavouring.

The meal is given in the X-ray department and examinations are made at intervals of about 6 and 24 hours.

Barium swallow is a modified barium meal used when a lesion of the œsophagus is suspected. The patient swallows two or three mouthfuls of a more concentrated solution of barium emulsion.

The Preparation of the Patient for these Examinations.—The patient should be given some non-gas-forming aperient 36 hours before the examination is to be made. An enema is only given when especially requested. All medicines containing bismuth are omitted for 48 hours. The day before the examination the patient is given a light diet, and he is given no food for 12 hours before examination is made.

A Barium Enema.—2 pints of barium emulsion are used. The bowel must be completely emptied before examination is made. This is effected by giving aperients at least 48 hours previously, an enema the night before, and colonic lavage on the morning of examination. The patient is allowed a light breakfast on the morning of the examination.

RADIOGRAPHY OF THE BILIARY TRACT

Cholecystography is effected by giving the patient a special dye following a straight X-ray. **Sodium Tetraiodophenolphthalein** is the substance used. It is excreted by the liver and concentrated in the gall bladder.

“**Opacol**” is a proprietary preparation of sodium iodophenolphthalein. It may be given by mouth or by intravenous injection.

“**Pheniodol**” is another substance used. It is a preparation of phenyl propionic acid, and is given by mouth. Dose, 6 tablets (0.5 grammes each) for patient over 10 stone; 4 tablets if under 10 stone.

Preparation of Patient and Method of X-ray.

“**Double Dose**” method:

An aperient is given 12 hours before the examination is made. On the morning of examination a light breakfast is given and a straight X-ray is taken. The dye is given immediately after, and the patient may be ordered lunch which is high in fat content. At 7 p.m. a fat-free supper is given, followed by a second dose of the dye. The following morning the patient is either starved or he has a fat-free breakfast. At 9 a.m. a radiograph is taken and the patient is then given a meal with a high fat content and another X-ray is taken 30 minutes later, and perhaps again 1 hour later. In some cases the first dose of the dye is omitted, the “single dose” method being employed.

RADIOGRAPHY OF THE GENITO-URINARY TRACT

Retrograde Pyelography. — Cystoscopic pyelography is effected by passing ureteric catheters into the ureters by means of a cystoscope. A warm solution of **sodium iodide** or **sodium bromide** is injected by means of a syringe.

Intravenous Pyelography.—**Iodoxyl (Uroselectan B)**, compound of iodine and pyridine, is the substance commonly used for this method of examination. Another substance used is Diodone (Per-abrodil).

20 c.c. of the drug used are injected into the median basilic vein. The drug is excreted by the kidney and renders the urinary tract opaque to rays. Radiographs are taken at intervals of 10, 15 and 40 minutes after the injection has been given. No fluids should be given to the patient for 3-6 hours before the injection is given in order to render the urine more concentrated.

RADIOGRAPHY OF THE SPINAL CORD, BRONCHIAL TREE AND FALLOPIAN TUBES

Iodised oil, a preparation of poppy-seed oil and 10 per cent. iodine, is used.

Preparations commonly used are:

Lipiodol, or Iodatol.

Neo-hydriol.

Method of Examination of Bronchial Tree.

The patient is starved for 3 hours before the examination is made. Decicain pastilles are sucked and then decicaine is sprayed on to the back of the throat and applied to the nose. A fine soft rubber tube is passed to the level of the uvula and 2 c.c. of decicain are injected by means of this tube into the trachea, followed by 10 c.c. of lipiodol into each lung. The radiograph is taken immediately.

Intraspinal injections of 2 to 3 c.c. of myelodil are made by means of lumbar or cisternal puncture, depending upon the site of the spinal lesion.

RADIOGRAPHY OF THE VASCULAR SYSTEM OF THE SKULL

Diodone, 35-50 per cent., is injected into carotid artery to show any abnormal condition existing in the cerebral vessels. The arteriogram must be taken immediately following the injection.

ANGIOCARDIOGRAPHY

40-50 c.c. of 70 per cent. **Diodone** are injected very rapidly via a cannula into the median basilic vein, and a succession of 8-12 films is taken about 10 seconds to demonstrate the cardio-vascular system. This is usually carried out under general anæsthetic.

AORTOGRAPHY

20 c.c. of 70 per cent. **Diodone** is injected into the abdominal aorta and a series of films is taken within a few seconds.

DRUGS USED FOR TESTING FUNCTION AND EFFICIENCY OF VARIOUS ORGANS

The Stomach.

Test meals are given to estimate the amount of hydrochloric acid present in the stomach for diagnostic purposes. The drugs used in conjunction with these are as follows:

Histamine.—Dose 7 to 15 minims of a 1 in 1000 solution given subcutaneously. This increases the secretion of hydrochloric acid. It may be given alone as a test or in conjunction with a test meal. It may cause the patient to be flushed, to have vertigo and headache, due to dilatation of the capillaries, which will cause a fall in the blood pressure.

Alcohol stimulates the secretion of hydrochloric

acid and 50 c.c. of a 7 per cent. solution may be given instead of the test meal.

Charcoal biscuits are given in conjunction with test meals the night before to indicate if gastric stasis is present. This will be shown by the presence of charcoal on withdrawing the fasting juice.

The Liver.

The investigation of duodenal contents is made by passing a Ryle's tube into the duodenum. Magnesium sulphate in solution 10 to 25 per cent. is injected into the duodenum to stimulate the flow of bile, and information regarding the function of the liver can thus be obtained. The preparation of the patient for this examination is similar to that before X-ray of the gall-bladder, the patient being given a non-fat-containing meal the night before. The test is performed the first thing in the morning when the patient awakes.

Glycuronic Test.—The patient is given 10 gr. sodium salicylate and the urine is collected for 24 hours. If no glycuronates are present, the liver is inefficient.

Intravenous Test.—Phenoltetrachlorphthalein is injected intravenously, the amount given depending upon the weight of the patient; 15 minutes after the injection 5 c.c. of blood are collected in a test tube and again after 45 minutes. If the liver is not functioning normally, the dye will be found in the blood 1 hour after the injection.

Hippuric Acid Test.—6 gr. of sodium benzoate in 50 c.c. of water are given to the patient, followed by half a tumbler of water. Hourly specimens of urine are obtained for 4 hours and the amount of hippuric acid excreted is estimated; 75 per cent. is normal if the liver is efficient.

Lævulose Test.—This is performed in the same way

as a glucose tolerance test, 100 G. lævulose be given instead of 50 G. glucose. See glucose tolerance test. A degree of liver inefficiency is shown a rise in the blood sugar to more than 150 mg. cent.

Drugs given to Test Pancreatic Efficiency.

Loewi's Test.—2 drops of adrenaline 1 in 1, solution are instilled into the conjunctiva; repeated in 15 minutes if the pupil is still undilated. Dilatation of the pupil shows that the pancreas is deficient.

Glucose Tolerance Test.—Normal blood sugar 100 mg. per 100 c.c. A specimen of blood is taken before breakfast whilst the patient is fasting. He is then given 50 grammes glucose in $\frac{1}{2}$ pint of water to drink and specimens of blood are taken at half hourly intervals for 2 hours. Specimens of urine are taken whilst the patient is fasting and at hourly intervals after the glucose has been given. If normal, blood sugar will resume its normal level in 2 hours.

Drugs given to Test Renal Efficiency.

Maclean's Urea Concentration Test.—The patient should fast overnight, and in the morning the bladder is emptied. He is then given 15 grammes of urea in 100 c.c. of water; specimens of urine are taken at hourly intervals for 3 hours after. Each time the whole of the urine passed must be saved and labelled with the exact time of passing. The amount of urea at the end of 2 hours should be 2 per cent. if the kidney is functioning normally.

Before the test is performed an estimation of the blood urea should have been done. The normal blood urea is 20 to 40 mgm. of urea per 100 c.c. of blood. If it is above 100, the test will not be performed.

Urea Clearance Test.—At an appropriate time in the morning—*e.g.*, 8 a.m.—instruct the patient to empty the bladder. The specimen is to be kept and labelled "A." At 9 a.m. again instruct the patient to empty the bladder. Keep the specimen and label it "B." Between 9.30 and 9.45 a.m. blood should be taken. At 10 a.m. again instruct the patient to empty the bladder and label it "C."

The exact time at which the urine is passed is to be noted on the label, and the bladder must be emptied each time completely, and the whole of each specimen of urine must be sent to the laboratory. Urea grammes may be given to the patient during the first hour of the test.

Rowntree's Test.—The patient is given 300 c.c. of water to drink and the bladder is emptied 20 minutes later. The patient is given an intramuscular injection of 6 mg. of phenolphthalein in 1 c.c. of saline solution. Specimens of urine are taken hourly for 2 hours. If normal, 50 per cent. of the dye should be excreted at the end of the first hour, and at the end of the second hour 20 to 25 per cent.

Indigo-Carmine Test.—20 c.c. of 0.4 per cent. solution is injected intramuscularly or intravenously, and the time is noted before the appearance of the dye in the urine. If the kidney is normal, it should appear in 5 to 10 minutes.

APPENDICES

APPENDIX I

WEIGHTS AND MEASURES

Weights (Apothecaries')

<i>Latin Name.</i>	<i>Symbol.</i>	<i>English Name.</i>	<i>Equivalent.</i>
Granum	gr.	A grain	—
Scrupulus	ʒ	A scruple	20 grains.
Drachma	ʒ	A drachm	60 grains or 3 scruples.
Oncia	ʒ	An ounce	480 grains or 8 drachms.

Weights (Avoirdupois).

Grain	gr.		
Ounce	oz.	437.5 grains or 28.35 grammes.	
Pound	lb.	7,000 grains or 16 ounces.	

Capacity.

<i>Latin Name.</i>	<i>Symbol.</i>	<i>English Name.</i>	<i>Equivalent.</i>
Minim	℥	A minim	
Drachma fluida	ʒ	A fluid drachm	60 minims.
Oncia fluida	ʒ	A fluid ounce	480 minims.
Pintarius	O	A pint	20 fluid ounces.
Gallus	C	A gallon	8 pints.

The British Pharmacopœia deprecates the use of symbols as likely to lead to error. Fluid drugs, if the Imperial system is used, should be prescribed in minims or fluid ounces.

IMPERIAL SYSTEM**Apothecaries' Weight (used in Dispensing).**

Unit: 1 grain.

20 grains = 1 scruple.

3 scruples = 1 drachm.

8 drachms = 1 ounce = 480 gr.

12 ounces = 1 pound = 5,760 gr.

Avoirdupois Weight (Standard System).

16 drachms = 1 ounce = 437 grains.

16 ounces = 1 pound = 7,000 grains.

14 pounds = 1 stone.

Apothecaries' Fluid Measure.

60 minims = 1 fluid drachm.

8 drachms = 1 fluid ounce.

20 ounces = 1 pint.

2 pints = 1 quart.

4 quarts = 1 gallon.

Domestic Measures.

1 teaspoonful is just over 1 fluid drachm, or 5 c.c.

1 dessertspoonful is about 2 fluid drachms.

1 tablespoonful is about $\frac{1}{2}$ fluid ounce, or 15 c.c.

1 teacupful is about 6 ounces.

1 tumblerful is about 11 fluid ounces, or just over $\frac{1}{2}$

N.B.—When accuracy of measurement is essential these must never be used.

METRIC SYSTEM**Weight.**

Unit: 1 gramme (G.), the weight of 1 mil. of water at

10 milligrams = 1 centigram

10 centigrams = 1 decigram = 1.5 grains.

10 decigrams = 1 gramme = 15.43 grains.

1,000 grammes = 1 kilogram = 2.2 pounds.

Fluid Measure.

Unit: 1 cubic centimetre (c.c.) or 1 millilitre (1 mil).
 1,000 cubic millimetres = 1 cubic centimetre = 17 minims.
 1,000 cubic centimetres = 1 litre = $1\frac{3}{4}$ pints = 35 ounces.

NOTE: 1 c.c. is approximately the same as 1 mil.

To convert:

Grammes into grains, multiply by 15.43.
 Kilograms into pounds, multiply by 2.2.
 Ounces (apothecaries') into grammes, multiply by 31.1.
 Grains into grammes, multiply by 0.06.
 Pounds (avoirdupois) into kilograms, multiply by 0.45

C.c. into Minims.

1 c.c. = 17 minims, or 1 mil.
 5 c.c. = 1 drachm, 24 minims.
 10 c.c. = 2 drachms, 49 minims.
 50 c.c. = 1 ounce, 6 drachms.
 100 c.c. = 3 ounces, 4 drachms.
 100 c.c. = 17 ounces, 5 drachms.
 litre = 35 ounces.

Minims into C.c.

17 minims = 1 c.c.
 1 drachm = 3.5 c.c.
 1 ounce = 28.4 c.c.
 1 pint = 568 c.c.

Percentage Solutions.

1 grain is not the weight of 1 minim of water.
 437½ grains is the weight of 480 minims of water.
 Therefore 100 grains is the weight of 109½ minims of water, or 110 approximately.

A 1 per cent. solution of morphine therefore means 1 grain contained in 110 minims of water.

1 gramme or 1 mil (1 c.c.) made up to 100 c.c. = 1 per cent. solution.

50 grammes made up to 100 c.c. = 50 per cent. solution.

1 ounce = 437.5 grains.

Therefore 1 per cent. solution will be 5 grains to the ounce approximately, or 1 grain in 110 minims:

$$\frac{(480 \times 100)}{437.5}$$

Dilution of Lotions.

Divide the strength of the dilution required by strength of the stock solution to obtain the total number of parts required, then take 1 part of the stock solution and the remaining parts of the diluent.

Example.—To obtain a dilution of lysol 1 in 200 from a stock solution of 1 in 20, $\frac{200}{20} = 10$; therefore 1 part of lysol 1 in 20 and 9 parts of water will be needed—2 ounces to the pint.

To obtain a dilution of 1 in 160 from a 5 per cent. solution: 5 per cent. means 5 parts in every 100 parts. Therefore 1 part in

$$\frac{100}{5} = 20 \text{ parts.}$$

Required dilution is 1 part in 160 parts:

$$\frac{160}{20} = 8$$

Therefore 1 part of the solution and 7 parts of water will be needed—i.e., 1 drachm to the ounce, or $2\frac{1}{2}$ ounces to the pint.

To give Fractions of Drugs.

Stock solution of atropine is $\frac{1}{150}$ grain in 5 minims.

To give $\frac{1}{100}$ grain from stock solution of atropine.

There is 1 grain in 5×150 minims and $\frac{1}{100}$ grain

$$\frac{5 \times 150}{100} = 7\frac{1}{2} \text{ minims.}$$

Since a fraction of a minim cannot be measured accurately, 7 minims only would be administered.

If the drug is in tablet form, take 2 tablets containing $\frac{1}{150}$ grain and dissolve them in 12 minims of water.

Then $\frac{2}{150}$ or $\frac{1}{75}$ grain will be in 12 minims.

1 grain will be in 12×75 minims.

$\frac{1}{100}$ grain will be in

$$\frac{12 \times 75}{100} = 9 \text{ minims.}$$

Give 9 minims and throw away 3 minims.

To make Normal Saline.

Normal saline is 0.9 per cent.

To prepare 1 pint (437.5 gr. to the ounce):

$$\frac{87.5 \times 1 \times 0.9}{1}$$

$$= 87.5 \times 0.9.$$

= 78.75 gr., or 1 drachm approximately.

Dosage for Children.

Young's formula for calculating the proportion of the adult dose of a drug to be given to a child:

$$\frac{\text{Age of child}}{\text{Age of child} + 12}.$$

This formula only gives an approximate dose, and should not be used for such drugs as morphine or opium preparations.

APPENDIX II

ABBREVIATIONS COMMONLY USED

<i>Abbreviation.</i>	<i>Latin.</i>	<i>English.</i>
a, āā	ana	of each.
a.c.	ante cibos (cibum)	before meals food.
add.	adde	add.
ad	ad	to, up to.
ad lib.	ad libitum	at pleasure.
æq.	æquales	equal.
alt. die.	alternis diebus	alternate days.
alt. hor.	alternis horis	every other hour.
alt. noct.	alternis noctibus	alternate nights.
amb.	ambo	both.
aq. dest.	aqua destillata	distilled water.
b.i.d. or b.d.	bis in die	twice a day.
bis hor.	bis hora	every half-hour.
ċ, c.	cum	with.
cat. lin.	cataplasma lini	poultice, linseed.
cat. sinap.	cataplasma sinapis	poultice, mustard.
co.	compositus	compound.
coch.	cochleare	spoonful.
collyr.	collyrium	eyewash.
collut.	collutorium	mouth-wash.
conf.	confectio	confection.
c.m. or c.m.s.	cras mane (sumendum)	to-morrow morning.
c.n.	cras nocte	to-morrow night.
dil.	dilutus	dilute.
emp.	emplastrum	plaster.
ex. aq.	ex aqua	in water.
fort.	fortis	strong.
fot.	fotus	fomentation.
ft.	fiat	let it be made.
ft. mist. or hst.	fiat mistura (haustus)	let a mixture (draught) be made.
garg.	gargarisma	gargle.
gutt., gtt.	gutta	a drop.
hirud.	hirudo	leech.
h.n.	hac nocte	to-night.
h.s.	hora somni	at bedtime.
hor. decub.	hora decubitus	at bedtime.

<i>Abbreviation.</i>	<i>Latin.</i>	<i>English.</i>
i.c.	inter cibos	between meals.
id.	idem	the same.
linct.	linctus	a linctus.
lin.	linimentum	a liniment.
liq.	liquor	solution.
lot.	lotio	lotion.
m. prim.	mane primo	early in the morning.
mist.	mistura	mixture.
m.	misce, mitte	mix, send.
o.m.	omni mane	every morning
o.n.	omni nocte	every evening.
p.c.	post cibos	after meals.
pil.	pilula	a pill.
p.r.n.	pro re nata	as occasion arises
pulv.	pulvis	powder.
q.q.	quaque	each, every.
q.s.	quantum sufficiat	sufficient.
quart. hor.	quarta hora	four-hourly.
4tis hor.	quartis horis	four-hourly.
q.d.s.	quater in die sumendum	four times a day.
R.	recipe	take.
rep.	repetatur	let it be repeated.
s.o.s.	si opus sit	if necessary (not to be repeated).
ss.	semis	half.
stat., st.	statim	immediately.
tab.	tabella	tablet.
troch.	trochiscus	lozenge.
t.d., t.i.d., t.d.s.	ter (in) die (sumendum)	three times a day
sig.	signetur	let it be labelled.
sum., s.	sumendus -a -um	let it be taken.
s.v.g.	spiritus vini gallici	brandy.
s.v.r.	spiritus vini rectificatus	alcohol.
ung	unguentum	an ointment.
vap.	vapor	inhalation.

APPENDIX III

DOSES OF DRUGS IN COMMON USE

Abbreviations: G. = gramme. gr. = grain. mil. = millilitre

Drug.	Metric.	Imperial.
Acetanilidum (antifebrin) ..	0·12 to 0·3 G.	2 to 5 gr.
Acidum:		
Acetylsalicylicum (aspirin) ..	0·3 to 1 G.	5 to 15 gr.
Benzoicum	0·3 to 1 G.	5 to 15 gr.
Hydrochloricum dilut. ..	0·3 to 4 mil.	5 to 60 min.
Mandelicum	2 to 4 G.	30 to 60 gr.
Salicylicum	0·3 to 0·6 G.	5 to 10 gr.
Adrenalinæ hydrochloridi liq. ..	0·12 to 0·5 mil.	2 to 8 min.
Allobarbitonum (dial)	0·03 to 0·18 G.	½ to 3 gr.
Allonal	—	3 to 6 gr.
Aloes	0·12 to 0·3 G.	2 to 5 gr.
Pilula	0·25 to 0·5 G.	4 to 8 gr.
Amidopyrina (pyramidon) ..	0·3 to 0·6 G.	5 to 10 gr.
Ammonium	Dil. 8 to 30 mil.	½ to 1 fl. oz.
Ammonii acetatis	Liq. fort. 1 to 4 mil.	15 to 60 m.
Ammonii carbonas	0·3 to 0·6 G.	5 to 10 gr.
Ammonii chloridum	0·3 to 4 G.	5 to 60 gr.
Ammonii mandelas	3·5 G.	50 gr.
Spiritus ammoniæ aromaticus	2 to 4 mil.	30 to 60 m.
Amylis nitrus	0·12 to 0·3 mil.	2 to 5 min.
Amytal (<i>hypnotic dose</i>)	0·1 to 0·3 G.	1½ to 5 gr.
Amytal sodium (<i>hypnotic dose</i>)	0·06 to 0·2 G.	1 to 3 gr.
Antifebrin	0·12 to 0·3 G.	2 to 5 gr.
Antipyrin	0·3 to 0·6 G.	5 to 10 gr.
Apomorphinæ hydrochloridum (<i>emetic and hypnotic</i>)	0·002 to 0·008 G.	⅓ to ⅓ gr.
Aqua menthæ piperitæ	15 to 30 mil.	½ to 1 fl. oz.
Aspirin (acetylsalicylic acid) ..	0·3 to 1 G.	5 to 15 gr.
Atebrin musonate	0·05 to 0·1 G.	¾ to 1½ gr.
Aureomycin { (<i>orally</i>)	0·6 to 3·5 G.	9 to 54 gr.
{ (<i>intramuscular</i>)	0·01 to 0·02 G.	⅓ to ⅓ gr.
Belladonnæ tinctura	0·3 to 2 mil.	5 to 30 min.
Extractum belladonnæ siccum	0·015 to 0·06 G.	¼ to 1 gr.
Bismuthi carbonas	0·6 to 2 G.	10 to 30 gr.
Injectio (bismostab)	0·5 to 1 mil.	8 to 15 min.
Bromidum potassii	0·3 to 2 G.	5 to 30 gr.
Sodii	0·3 to 2 G.	5 to 30 gr.
Butobarbitone (soneryl) ..	0·06 to 0·12 G.	1 to 2 gr.
Caffeine	0·12 to 0·3 G.	2 to 5 gr.
Sodii benzoas { (<i>orally</i>)	0·3 to 1 G.	5 to 15 gr.
{ (<i>hypodermically</i>)	0·12 to 0·3 G.	2 to 5 gr.
Calcium:		
Calcii carbonas	1 to 5 G.	15 to 60 gr.
Calcii chloridum	0·6 to 2 G.	10 to 30 gr.

Drug.	Metric.	Imperial.
Calcii gluconas	2 to 4 G.	30 to 60 gr.
Calcii lactas	1 to 4 G.	15 to 60 gr.
Calcii phosphas	0.6 to 2 G.	10 to 30 gr.
Camel	0.03 to 0.2 G.	$\frac{1}{2}$ to 3 gr.
Cannaphor, spirit of	0.3 to 2 mil.	5 to 30 minims.
Cholchol { (orally)	0.001 to 0.004 G.	$\frac{1}{16}$ to $\frac{1}{8}$ gr.
Cholchol { (hypodermically)	0.00025 to 0.0005 G.	$\frac{1}{160}$ to $\frac{1}{16}$ gr.
Chlorbromal (adalin)	0.3 to 1 G.	5 to 15 gr.
Chloridiazol { (orally)	0.05 to 1 G.	$\frac{1}{2}$ to $1\frac{1}{2}$ gr.
Chloridiazol { (hypodermically)	1 to 3 mil.	15 to 45 minims.
Chloridialis hydras	0.3 to 1.2 G.	5 to 20 gr.
Chloridaria Sagrada:		
Extractum cascarae sagradae siccum	0.12 to 0.5 G.	2 to 8 gr.
Extractum cascarae sagradae liquidum	2 to 4 mil.	30 to 60 minims.
Chlorbutol (chloretone)	0.3 to 1.2 G.	5 to 20 gr.
Chlorpromycetin { (orally)	4 to 6 G.	
Chlorphenura (atophan)	0.3 to 0.6 G.	5 to 10 gr.
Chloridainæ hydrochloridum	0.008 to 0.016 G.	$\frac{1}{16}$ to $\frac{1}{8}$ gr.
Chloridaineæ phosphas	0.016 to 0.06 G.	$\frac{1}{4}$ to 1 gr.
Chloramine { (orally)	0.2 to 0.5 G.	3 to 8 gr.
Chlormethamide) { (hypodermically)	0.5 to 1.25 G.	8 to 20 gr.
Chloral (allobarbitonum)	0.03 to 0.8 G.	$\frac{1}{2}$ to 3 gr.
Chloromorphinæ hydrochloridum (heroin)	0.0025 to 0.008 G.	$\frac{1}{16}$ to $\frac{1}{8}$ gr.
Chloritalis Folium:		
Chlorpulverata	0.03 to 0.1 G.	$\frac{1}{2}$ to $1\frac{1}{2}$ gr.
Chlorinctura	0.3 to 1 mil.	5 to 15 minims.
Chloritalinum	0.004 to 0.012 G.	$\frac{1}{16}$ to $\frac{1}{8}$ gr.
Chloritoxinum	0.0001 to 0.001 G.	$\frac{1}{160}$ to $\frac{1}{16}$ gr.
Chloritoxinum { (initial dose)	0.001 to 0.0015 G.	$\frac{1}{16}$ to $\frac{1}{16}$ gr.
Chloritoxinum { (maintenance dose)	0.00025 G.	$\frac{1}{160}$ gr.
Chloritoxinum { (intravenous dose)	0.0005 to 0.001 G.	$\frac{1}{160}$ to $\frac{1}{16}$ gr.
Chlorretin	0.6 to 1.2 G.	10 to 30 gr.
Chloryl (car- { (orally)	0.001 to 0.004	$\frac{1}{16}$ to $\frac{1}{8}$ gr.
Chlorchol) { (hypodermically)	0.00025 to 0.0005 G.	$\frac{1}{160}$ to $\frac{1}{16}$ gr.
Chlorer's powders	—	5 to 10 gr.
Chlorton's syrup	2 to 4 mil.	30 to 60 minims.
Chlorstinae et bismuthi iodidum	0.06 to 0.2 G.	1 to 3 gr.
Chlorhydrochloridum	0.03 to 0.06 G.	$\frac{1}{2}$ to 1 gr.
Chlorotæ Extractum liquidum	0.6 to 1.2 mil.	10 to 20 minims.
Chlorota præparata	0.3 to 1 G.	5 to 15 gr.

Drug.	Metric.	Imperial.
Ergometrine { (intramuscularly)	0.00025 to	$\frac{1}{120}$ to $\frac{1}{120}$ gr.
(intravenously) ...	0.0005 G.	
	0.000125 to	$\frac{1}{120}$ to $\frac{1}{120}$ gr.
	0.00025 G.	
Ergotoxinæ æthanosulphonas	0.0005 to 0.001 G.	$\frac{1}{120}$ to $\frac{1}{60}$ gr.
Ephedrinæ hydrochloridum ..	0.016 to 0.1 G.	$\frac{1}{2}$ to 1½ gr.
Eserine	0.0006 to	$\frac{1}{120}$ to $\frac{1}{100}$ gr.
	0.0012 G.	
Evipan so- { (orally)	0.25 to 0.5 G.	4 to 8 gr.
dium (hexo- { (intravenously or	0.2 to 1 G.	3 to 15 gr.
barbitone) { (intramuscularly)		
(by rectal injection)	2 to 4 G.	30 to 60 gr.
Ferri et ammonii citras	1.3 to 2.6 G.	20 to 40 gr.
Syrupus ferri phosphatis co.	2 to 8 mil.	30 to 120 m.
(Parrish's syrup)		
Syrupus ferri phosphatis co.	2 to 4 mil.	30 to 60 m.
cum quina et strychnina		
(Easton's syrup)		
Glycerilis trinitratis liq. ..	0.03 to 0.12 mil	$\frac{1}{2}$ to 2 mini
Tabellæ	—	1 to 2 table
Heroin (see Diamorphine hydrochloride)		
Hexamina.. .. .	0.6 to 2 G.	10 to 30 gr.
	0.25 to 0.5 G.	4 to 8 gr.
Hexabarbito- { (intravenously or	0.2 to 1 G.	3 to 15 gr.
num soluble { (intramuscularly)		
(rectal injection)	2 to 4 G.	30 to 60 gr.
Histamine.. .. .	0.0005 to	$\frac{1}{120}$ to $\frac{1}{60}$ gr.
	0.001 G.	
Hydrargyri subchloridum (calomel)	0.03 to 0.2 G.	$\frac{1}{2}$ to 3 gr.
Hydrargyrum cum creta (grey powder)	0.06 to 0.3 G.	1 to 5 gr.
Hyoscinae hydrobromidum ..	0.0003 to	$\frac{1}{200}$ to $\frac{1}{100}$ gr.
	0.0006 G.	
Injectio bismuthi	0.5 to 1 mil.	8 to 15 min
Injectio mersalyli	0.5 to 2 mil.	8 to 30 min
Iodidum potassii	0.3 to 2 G.	5 to 30 gr.
Sodii	0.3 to 2 G.	5 to 30 gr.
Ipecacuanhæ et opii pulv. ..	0.3 to 0.6 G.	5 to 10 gr.
Tinctura { (expectorant dose)	0.6 to 2 mil.	10 to 30 min
(emetic dose) ..	15 to 30 mil.	$\frac{1}{2}$ to 1 fl. oz.
Jalap pulverata	0.3 to 1.2 G.	5 to 20 gr.
Pulv. jalapæ co.	0.6 to 4 G.	10 to 60 gr.
Leptazolium { (orally)	0.05 to 1 G.	$\frac{1}{2}$ to 1½ gr.
(cardiazol) { (hypodermically)	1 to 3 mil.	15 to 45 min
Liquor adrenalinae hydrochloridi	0.12 to 0.5 mil.	2 to 8 min
Ammonii acetatis dil. ..	8 to 30 mil.	$\frac{1}{2}$ to 1 fl. oz.
Fort.	1 to 4 mil.	15 to 60 min

<i>Drug.</i>	<i>Metric.</i>	<i>Imperial.</i>
senicalis	0·12 to 0·5 mil.	2 to 8 minims.
ycerylis trinitratis	0·03 to 0·12 mil.	$\frac{1}{2}$ to 2 minims.
di aquosus (Lugol's iodine) ..	0·3 to 1 mil.	5 to 15 minims.
di mitis	0·3 to 2 mil.	5 to 30 minims.
orphinæ hydrochloridi	0·3 to 2 mil.	5 to 30 minims.
ininæ ammoniatus	2 to 4 mil.	30 to 60 minims.
rychninæ	0·2 to 0·8 mil.	3 to 12 minims.
l's iodine	0·3 to 1 mil.	5 to 15 minims.
inal (phenobarbitone)	0·03 to 0·12 G.	$\frac{1}{2}$ to 2 gr.
agnesii carbonas levis	0·6 to 1·2 G.	10 to 20 gr.
Ponderosus	0·6 to 1·2 G.	10 to 20 gr.
kidum leva	0·6 to 1·2 G.	10 to 20 gr.
Ponderosum	0·6 to 1·2 G.	10 to 20 gr.
has (Epsom salts)	2 to 6 G.	30 to 90 gr.
or magnesiæ bicarbonatis	30 to 60 mil.	1 to 2 fl. oz.
ura magnesiæ hydroxidi (team of magnesia)	4 to 16 mil.	60 to 240 minims.
inal (barbitone soluble)	0·3 to 0·6 G.	5 to 10 gr.
thæ piperitæ aqua	15 to 30 mil.	$\frac{1}{2}$ to 1 fl. oz.
Spiritus	0·3 to 2 mil.	5 to 30 minims.
acrinæ hydrochloridi (ate- in)	0·05 to 0·1 G.	$\frac{3}{4}$ to 1 $\frac{1}{2}$ gr.
nylsulphonal (trional)	0·3 to 1·2 G.	5 to 20 gr.
ura cretæ	15 to 30 mil.	$\frac{1}{2}$ to 1 fl. oz.
ura sennæ co.	30 to 60 mil.	1 to 2 fl. oz.
phinæ hydrochloridi liq.	0·3 to 2 mil.	5 to 30 minims.
hydrochloridum	0·008 to 0·02 G.	$\frac{1}{8}$ to $\frac{1}{4}$ gr.
ippositorium	0·015 G.	$\frac{1}{4}$ gr.
ochisci morphinæ { (Morph.)	0·002 G.	$\frac{1}{32}$ gr.
ipecacuanhæ { (Ipecac.)	0·006 G.	$\frac{1}{16}$ gr.
phinæ sulphas	0·008 to 0·02 G.	$\frac{1}{8}$ to $\frac{1}{4}$ gr.
phinæ tartras	0·008 to 0·02 G.	$\frac{1}{8}$ to $\frac{1}{4}$ gr.
abutal (pen- { (orally,	0·1 to 0·2 G.	1 $\frac{1}{2}$ to 3 gr.
arbitone) { rectally)		
	(intravenously)	
	0·2 to 0·3 G.	3 to 5 gr. in 150 minims sterile water.
ethamide { (orally)	0·2 to 0·5 G.	3 to 8 gr.
	(intravenously)	0·5 to 1·25 G. 8 to 20 gr.
vomica:		
xtractum nucis vomicæ liq.	0·06 to 0·2 mil.	1 to 3 minims.
xtractum nucis vomicæ sic.	0·015 to 0·06 G.	$\frac{1}{4}$ to 1 gr.
nctura nucis vomicæ	0·6 to 2 mil.	10 to 30 minims.
opon (papaveretum) (orally)	0·01 to 0·02 G.	$\frac{1}{4}$ to $\frac{1}{2}$ gr.
m pulverata	0·03 to 0·2 G.	$\frac{1}{2}$ to 3 gr.
nct. opii (laudanum)	0·3 to 2 mil.	5 to 30 minims.
nct. opii camphorata (pare- goric)	2 to 4 mil.	30 to 60 minims.
lv. ipecacuanhæ et opii	0·3 to 0·6 G.	5 to 10 gr.

<i>Drug.</i>	<i>Metric.</i>	<i>Imper.</i>
Suppositorium plumbi cum opio { (Opium) (Lead acetate)	0.06 G. 0.2 G.	1 gr. 3 gr.
Pamaquin	0.02 to 0.04 G.	$\frac{1}{8}$ to $\frac{3}{8}$ gr.
Paraffinum liquidum	7.5 to 30 mil.	$\frac{1}{4}$ to 1 fl. oz.
Paraldehydum	2 to 8 mil.	30 to 120 min.
Pentobarbitone { (orally) (nembutal) { (intravenously)	0.1 to 0.2 G. 0.2 to 0.3 G.	$1\frac{1}{2}$ to 3 gr. 3 to 5 gr.
Phanodorm	0.2 to 0.4 G.	3 to 6 gr.
Phenacetinum	0.3 to 0.6 G.	5 to 10 gr.
Phenazone (antipyrin)	0.3 to 0.6 G.	5 to 10 gr.
Phemitonum (prominal)	0.03 to 0.4 G.	$\frac{1}{2}$ to 6 gr.
Phenobarbitone (luminal)	0.03 to 0.12 G.	$\frac{1}{2}$ to 2 gr.
Phenolphthaleinum	0.06 to 0.3 G.	1 to 5 gr.
Physostigminæ salicylas (eserine)	0.0006 to 0.0012 G.	$\frac{1}{100}$ to $\frac{1}{50}$ gr.
Picrotoxin	0.0006 to 0.0025 G.	$\frac{1}{100}$ to $\frac{1}{25}$ gr.
Pilocarpinæ nitras	0.003 to 0.012 G.	$\frac{1}{20}$ to $\frac{1}{5}$ gr.
Potassii acetat	1 to 4 G.	15 to 60 gr.
Bicarbonas	1 to 4 G.	15 to 60 gr.
Bromidum	0.3 to 2 G.	5 to 30 gr.
Carbonas	0.12 to 0.3 G.	2 to 5 gr.
Chloras	0.3 to 0.6 G.	5 to 10 gr.
Citras	1 to 4 G.	15 to 60 gr.
Iodidum	0.3 to 2 G.	5 to 30 gr.
Pulv. ipecacuanhæ et opii	0.3 to 0.6 G.	5 to 10 gr.
Jalapæ co.	0.6 to 4 G.	10 to 60 gr.
Rhei co. (Gregory's powder)	0.6 to 4 G.	10 to 60 gr.
Glycyrrhizæ co.	4 to 8 G.	60 to 120 gr.
Prominal	0.03 to 0.4 G.	$\frac{1}{2}$ to 6 gr.
Pyramidon (amidopyrine)	0.3 to 0.6 G.	5 to 10 gr.
Quininæ sulphas:		
Ammoniatuſ liq.	2 to 4 mil.	30 to 60 min.
Sulphas	0.06 to 0.6 G.	1 to 10 gr.
Bisulphas	0.06 to 0.6 G.	1 to 10 gr.
Hydrochloridum	0.06 to 0.6 G.	1 to 10 gr.
Dihydro-chlori- { (orally) dum { (intramuscularly and intravenously)	0.06 to 0.6 G. 0.3 to 0.6 G.	1 to 10 gr. 5 to 10 gr.
Sennæ confectio	4 to 8 G.	60 to 120 gr.
Fructus	0.6 to 2 G.	10 to 30 gr.
Syrupus	2 to 8 mil.	30 to 120 min.
Mist. sennæ co. ("black draught")	30 to 60 mil.	1 to 2 fl. oz.
Sodium amyſal	0.06 to 0.2 G.	1 to 3 gr.
Sodii benzoas	0.3 to 2 G.	5 to 30 gr.
Bicarbonas	1 to 4 G.	15 to 60 gr.
Bromidum	0.3 to 2 G.	5 to 30 gr.
Carbonas	0.3 to 0.1 G.	5 to 15 gr.

Drug.	Metric.	Imperial.
citras	1 to 4 G.	15 to 60 gr.
didum	0.3 to 2 G.	5 to 30 gr.
andelas	3 to 5 G.	50 gr.
itras	0.03 to 0.12 G.	$\frac{1}{2}$ to 2 gr.
nosphas	2 to 8 G.	30 to 120 gr.
Acidus	2 to 4 G.	30 to 60 gr.
ilicylas	0.6 to 2 G.	10 to 30 gr.
alphas	2 to 8 G.	30 to 120 gr.
iosulphas	0.3 to 1 G.	5 to 15 gr.
eryl (butobarbitone)	0.06 to 0.12 G.	1 to 2 gr.
itus ammoniæ aromaticus	2 to 4 mil.	30 to 60 minims.
amphoræ	0.3 to 2 mil.	5 to 30 minims.
entha piperitæ	0.3 to 2 mil.	5 to 30 minims.
ll	0.06 to 0.2 G.	1 to 3 gr.
rupus scillæ	2 to 4 mil.	30 to 60 minims.
xymel scillæ	2 to 4 mil.	30 to 60 minims.
nct. scillæ	0.3 to 2 mil.	5 to 30 minims.
ptomycin {	Intramuscularly	15 to 30 gr.
	Intrathecally :	
	Initial	$\frac{3}{4}$ to 1 $\frac{1}{2}$ gr.
	Maintenance	$\frac{3}{8}$ to $\frac{1}{2}$ gr.
phanthin	0.00025 to 0.001 G.	$\frac{1}{160}$ to $\frac{1}{16}$ gr.
chninæ hydrochloridum	0.002 to 0.008 G.	$\frac{1}{32}$ to $\frac{1}{8}$ gr.
hydrochloridi liq.	0.2 to 0.8 mil.	3 to 12 minims.
honal	0.3 to 1.28 G.	5 to 20 gr.
honamides	1 tablet equals 0.5 G.	
obromina et sodii salicylis (diuretin)	0.6 to 1.2 G.	10 to 20 gr.
tura belladonnæ	0.3 to 2 mil.	5 to 30 minims.
ardamomi co.	2 to 4 mil.	30 to 60 minims.
nchonæ	2 to 4 mil.	30 to 60 minims.
igitalis	0.3 to 1 mil.	5 to 15 minims.
oscyami	2 to 4 mil.	30 to 60 minims.
li mitis	0.3 to 2 mil.	5 to 30 minims.
ecacuan- (emetic dose)	15 to 30 mil.	$\frac{1}{2}$ to 1 fl. oz.
æ (expectorant dose)	0.6 to 2 mil.	10 to 30 minims.
icis vomicæ	0.6 to 2 mil.	10 to 30 minims.
iji camphorata	2 to 4 mil.	30 to 60 minims.
illæ	0.3 to 2 mil.	5 to 30 minims.
amonii	0.3 to 2 mil.	5 to 30 minims.
ophanthi	0.12 to 0.3 mil.	2 to 5 minims.
al (methylsulphonal)	0.3 to 1.2 G.	5 to 20 gr.
.. ..	1 to 16 G.	15 to 240 gr.
ropine	0.6 to 2 G.	10 to 30 gr.
mon	—	1 to 2 tablets.
nal (barbitone)	0.3 to 0.6 G.	5 to 10 gr.

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Acacia, gum	Gummy exudate from acacia	6-7% solution in normal saline. Injectio sod. chlorid. et acaciæ	10 oz.
Acetanilidum (antifebrin)	Obtained from action of acetic acid on aniline	Pulv. acetanilidæ co. contains acetanilide, caffeine and sod. bicarb. Tab. acetanilidæ c. codeina	3-5 gr.
Acetylsalicylic acid (aspirin)	Compound made from salicylic acid	Tab. aspirin. Mistura acidi acetylsalicylic. It is also combined with phenacetin, quinine and caffeine. Trade preparation "Anadin"	5-10 gr., ½-1 oz.
Acidum boricum (boracic acid)	Action of sulphuric acid on borax	Pulv. acid. boric. Lotio acidi borici. Oculentum acidi borici. Unguentum acidi borici	—
	Borax	Glycerinum boracis	—
Acidum tannicum (tannic acid)	Obtained from oak galls	Glycerin. acid. tannic. Troch. acid. tannic. Ung. acid tannic. Pasta acid. tannic. (tannic acid jelly) Suppos. acid. tannic Tannic acid	15% glycerine, 10-30 minims ½ gr. 20% with glycerine — — 2½-20% solution

IN DRUGS USED

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
ises blood pressure. ven after loss of ood	—	—
tipyretic and anal- esic. Given for neu- algia and migraine	Cyanosis, dyspnoea, erythema, collapse	Emetic. Stomach lav- age. Sp. of ammonia. Stimulants, as strych- nine. Oxygen.
algescic and antipy- retic. Given to relieve headache and neural- gia; used as gargle after throat opera- tions	Gastric pain, vomit- ing, giddiness and rash. Cyanosis, weak pulse	Emetic. Stomach lav- age with soda bi- carbonate. Stimu- lants and saline in- fusion.
tiseptic. Dusting powder; irrigation of eyes, bladder, vagina; ointment for eyes and wounds, boric lint or surgical dressing	Vomiting, collapse	Purgative. Magne- sium sulphate. Stomach wash.
tiseptic. For cleans- ing mouth	—	—
stringent. For in- flamed throats	—	—
—	—	—
r treatment of hæ- morrhoids, ulcers and bleeding surfaces	—	—
r burns	—	—
—	—	—
r burns	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Adrenaline or epinephrine	Active principle of adrenal gland or prepared synthetically	Liquor adrenalinae hydrochloridi 1-1,000 solution	— 1-5 minims 15 minims 1-5 minims
Allonal. See	Barbiturates.		
Amidopyrine	Amidopyrine	Pyramidon	5-10 gr.
Ammonium	Solution of ammonia gas in water	Ammonium carbonate. Ammonium bicarbonate. Sp. ammoniæ aromaticus (sal volatile)	15-60 minims —
	By neutralising ammonia with hydrochloric acid	Ammonium chloride. Ammonium acetate. Liquor ammonii acetatis	—
Amyl nitrite	Salt formed by the action of nitrous acid with alcohol	—	2-5 minims
Antibiotics	See Chapter IX		
Apomorphine hydrochloride	Alkaloid obtained from morphine	Apomorphine hydrochloride	$\frac{1}{64}$ - $\frac{1}{32}$ gr. $\frac{1}{32}$ - $\frac{1}{8}$ gr.

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
Sedative. To check bleeding from nose and tooth socket	Collapse, feeble pulse, headache, giddiness, nausea, pallor and palpitation	Glucose given intravenously.
Vaso-constrictor; raises blood pressure. Given in condition of shock and serum sickness and in circulatory collapse	—	—
Stimulant	—	—
Given in asthma. Relaxes bronchial muscles	—	—
Analgesic and antipyretic	Prolonged use may give rise to agranulocytosis characterised by marked fall in leucocyte count, fever, ulceration of mouth and throat	Blood transfusion, penicillin, pentanucleotide
Expectorant in bronchitis	Swelling of tongue, convulsions, collapse, respiratory paralysis	Dilute acids. Artificial respiration. Tracheotomy or intubation if necessary.
Stimulant for fainting	—	—
Diuretic in <i>B. coli</i> dysentery, and given in renal dropsy	—	—
Vaso-dilator. Given in angina pectoris and asthma	Cyanosis, breathlessness, dizziness, flushing, headache	Keep patient warm in recumbent position. Artificial respiration. Injection of adrenalin.
Expectorant in bronchitis	As for morphine	Keep patient warm. Spirit of ammonia in water.
Antidote given for alcoholic poisoning; hypnotic	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Arsenic	Obtained from arsenical ores	Liquor arsenicalis	2-8 minims
	Arsenical compounds. Trade preparations used	Neosalvarsan. Novarsenobillon or N.A.B. Sulpharsphenamine. Neosphenamine. Devegan	— 1 tablet
		Acetarsol vaginal compound	Tablets or powder form
Aspirin. See	Acetyl salicylic acid.		
Atropine	Alkaloid obtained from belladonna	Guttæ atropinæ	$\frac{1}{2}$ -2%
		Lamellæ atropinæ	$\frac{1}{5000}$ gr.
		Oculentum atropinæ	1%
		Atropine sulphate	$\frac{1}{10}$ - $\frac{1}{50}$ gr.
Belladonna	Deadly nightshade	Belladonna plaster	—
		Tincture of belladonna Dry extract of belladonna	5-30 minims $\frac{1}{4}$ -1 gr.
Barbiturates	Barbituric acid	Following trade preparations:	

Action and Uses.	Poisoning Symptoms.	Treatment.
General tonic and hæ- matinic in anæmia. Nerve tonic in derma- titis	Edema of eyelids. Vomiting, diarrhœa, abdominal pain, loss of appetite, tingling sensation in feet. Dermatitis	Emetic or lavage. Ferrous hydroxide. Magnesium sulphate. Demulcents. Stimu- lants.
Specific remedy for syphilis	—	—
—	—	Treatment of infec- tion due to <i>Tri- chomonas vaginas</i> .
—	—	Treatment of infec- tion due to <i>Tri- chomonas vaginas</i> .
Diuretic and cyclo- plegic. Given in kera- titis and iritis	Thirst and dryness of mouth. Pupils di- lated, rapid pulse. Slow respiration. Mental excitement, delirium, coma and rash	Emetic. Stomach lav- age of dilute tannic acid or potassium permanganate. Warmth. Fluids. Coffee per rectum.
Diuretic. Iritis	—	—
Tumors of cornea	—	—
Relaxes spasm of muscle. Given in renal, biliary, and in- testinal colic and in asthma. Checks se- cretion before anæ- sthetic	—	—
Checks secretion. Giv- en in pleurisy and amblyopia	—	—
Antiperiodic. Given in malaria	—	—
Antiperiodic. Given in malaria	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>	<i>A</i> <i>ist</i>
Barbiturates (continued)		Allonal	3-6 gr.	m
	Allobarbitone	Dial	$\frac{1}{2}$ -3 gr.	m
	Hexobarbitone	Evipan	1-2 tablets	m
		Evipan, sodium	40-150 minims	In ve
	Phenobarbitone	Luminal	$\frac{1}{2}$ -2 gr.	m Sec
	Phenyl-ethyl barbituric acid			
	Soluble barbi- tone	Medinal	7 gr.	m
	Pentobarbitone	Nembutal	1 $\frac{1}{2}$ -3 gr.	mo or rec In ve inje In ve inje E mo E mo p rect orin veno E mo Intr nous subc neou ject B mo
			3-5 gr.	
		Pernocton	3-4 gr.	
		Cyclobarbitone (Phanodorm)	3-6 gr.	
		Sodium amytal	1-3 gr., 3-10 gr.	
		Somnifaine	—	
	Butobarbitone	Soneryl	1-2 gr.	

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
Analgesic. For neuralgia	Headache, visual disturbance. Slow respiration, oedema of base of lungs, followed by bronchopneumonia. Suppression of urine	Stomach lavage. Keep warm and keep awake. Stimulants, as coffee and strychnine. Saline given intravenously and per rectum. Artificial respiration.
Hypnotic	Agranulocytosis —	Picrotoxin given by injection in frequent doses.
Hypnotic and narcotic	—	—
Narcotic; basal hypnotic used in operations for thyrotoxicosis; hypnotic and sedative in chorea, epilepsy and eczema	—	—
Hypnotic	—	—
Basal hypnotic	—	—
—	—	—
Basal hypnotic	—	—
Hypnotic. In nervous conditions	—	—
Basal hypnotic	—	—
Sedative, hypnotic. Given in states of mental excitement	—	—
Hypnotic. Used in mania	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>	<i>A</i> <i>is</i>
Barbiturates (continued)	Barbiturate of amidopyrine with amidopy- rine Barbitone	Veramon	1-2 tablets	r
		Veronal	—	n
Bismuth carbonate	Obtained by the action of bis- muth nitrate with a soluble carbonate	—	10-30 gr.	n
		Powder	—	I ap
		Mist. bismuth. et sod. bicarb.	—	m
		Pulv. bismuth. co. (bismuth carb., calcium carb., magnesium carb., and sod. bicarbon- ate)	1-2 drachms	m
		Bismuth subgal- late. "Dermatol"	—	I
		Pasta bismuth. and iodoform (B.I.P.P.)	—	ap
		Salts of bismuth oxychloride. Bis- muth. præcipitatis. Injectio bismuthi. "Bismostab"	—	I m la je
Boracic acid. Bromide	See Acidum bo- rici.	Potassium bromide	5-30 gr.	
		Sodium bromide	5-30 gr.	
Caffeine	Obtained from dried leaves of <i>Thea chinensis</i> and from coffee seeds	Tab. caffeinæ	2-5 gr.	m
		Caffeina et sodii benzoas	—	By je

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
Analgesic. Given for neuralgia	—	—
Hypnotic in neurasthenia and cardiac conditions	—	—
Antacid; protective. Given in gastric ulcers	Stomatitis. Blue line round gum. Increased salivation. Vomiting and diarrhoea	—
Antiseptic. Dusting powder	—	—
Antacid. Gastric ulcer	Most complications occur as the result of local application	—
Antacid. Gastric ulcer	—	—
Given for diarrhoea	—	—
Antiseptic. For treatment of infected wounds	—	—
Specific remedy for syphilis	—	—
Sedative; hypnotic	Pustular skin eruption on face and body	—
Used in epilepsy and other nervous disorders	Depression, lethargy, mental faculties dulled, memory impaired	
Stimulant to respiratory system. Given for headache; for shock and collapse	Nausea, dizziness, restlessness, mental confusion, delirium	Sedatives given, as luminal.
Cardiac and respiratory stimulant. Given in uræmia	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>	<i>Ad- instr.</i>
Calcium	—	Calcium carbonate	—	m
		Creta. Mistura cre- tæ	—	m
		Pulv. cretæ aro- maticus c. opio	10-60 gr.	m
		Calcium chloride	—	m
		Calcium gluconate	—	In mu lar jec In ver in t In ver in ti E mo
Camphor	<i>Cinna m o m u m</i> <i>camphora</i> , an evergreen plant, or made synthetically	Tinct. opii cam- phorata	30-60 minims	E mo Int mus lar ject Lo appl tic B mo
		Spiritus camphoræ	5-30 minims	
		Camphor in oil	1-3 gr.	
		Linimentum cam- phoræ. Camphor- ated oil	—	
Chloral hydrate	Obtained by combination of chlorine gas with absolute alcohol	Chloral hydrate	5-30 gr.	
Cinchona	Dried bark of cinchona tree Active principle quinine	Syrup of chloral	$\frac{1}{2}$ -1 drachm	B mo
		Liquor quininae am- moniatus Syrupus ferri phos- phatis c. quinina et strychnina (Easton's syrup)	30-60 minims 30-60 minims	B mo B mo B mo

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
acid. Gastric ulcer	—	—
laxative. Given in diarrhoea	—	—
—	—	—
—	—	—
increase coagulability of blood. Given in hæmorrhage	—	—
increase coagulability of blood. Given in hæmorrhage	—	—
Given in tetany	—	—
pectorant. Given in coughs	Vomiting, nausea, pain in stomach. Headache, delirium, weak pulse, collapse	Emetic or lavage. Magnesium sulphate in water. Inhalations of ammonia. Stimulants.
mulant. Fainting attacks	—	—
heart stimulant and respiratory stimulant. Given in collapse	—	—
abefacient; counter-irritant	—	—
pnotic. Given in convulsions, eclampsia, chorea, mental excitement	Slow shallow breathing, cyanosis, stupor, coma	Stomach lavage. Artificial respiration. Stimulants, as coffee and strychnine. Intravenous glucose in normal saline.
—	—	—
typyretic. Given in fluenzal cold	Tinnitus, deafness, headache, nausea	Stop drug and give stimulants.
neral tonic and appetiser. Given in conditions of debility	Vomiting, slow and weak pulse	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>	
Cinchona (continued)		Tinct. cinchonæ	30-60 minims	
		Quinine sulphate	1-10 gr.	
		Quinine hydrochloride with urethane	3-6% solution	
		Quinine salicylate	2-5 grs.	
Cocaine*	Active alkaloid obtained from coca shrub	Cocaine	10% solution	
		Cocaine hydrochloride	0.1-2% solution	
		Guttæ cocainæ	1%	
		Oculentum cocainæ	0.25% solution	
		Lamellæ cocainæ	$\frac{1}{50}$ gr.	
		Trochisci krameriæ et cocainæ	$\frac{1}{10}$ gr.	
		Cocaine derivatives: Eucaine, holocaine, procaine, stovaine	—	
Codeine. See	Opium.			
Diamorphine hydrochloridum (heroin)	in). See Opium.			
Digitalis	Obtained from foxglove	Tinctura digitalis	5-15 minims	
		Digitalis folia	$\frac{1}{2}$ -3 gr.	

* N.B.—The strength of cocaine solution

Action and Uses.	Poisoning Symptoms.	Treatment.
ter	—	—
Specific and suppressive in malaria	—	—
cause sclerosis. For treatment of varicose veins	—	—
—	—	—
Analyses sensation; produces anæsthesia. Surface anæsthetic, sometimes combined with adrenalin	Slow respiration. Vomiting and diarrhœa. Delirium, followed by convulsions. Pulse rapid and weak	Stomach lavage with potassium permanganate or tannic acid. Ammonia inhalations. Strychnine $\frac{1}{4}$ gr. Sodium amytal intravenously. Coramine.
Local anæsthetic	—	—
Anæsthesia. Applied to conjunctiva	—	—
—	—	—
—	—	—
Local anæsthetic. In painful conditions of throat	—	—
—	—	—
Heart stimulant; slows and strengthens pulse beat; diuretic when given in cardiac dropsy. Given in cardiac failure; auricular fibrillation	Nausea, vomiting and diarrhœa. Headache, dizziness. Yellow and green vision. Irregular pulse causes "coupling" of beats. Diminution of urine	Emetic, stomach lavage. Stimulants, Atropine.
—	—	—

ould be clearly marked on bottle.

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Digitalis (continued)		Digitoxinum	$\frac{1}{60}$ gr.
		Digitalin	$\frac{1}{15}$ - $\frac{1}{6}$ gr.
Emetine.	See Ipecacuanha.		
Ephedrine hydrochloride	Alkaline salt obtained from Chinese plant	Ephedrine hydrochloride	$\frac{1}{4}$ - $1\frac{1}{2}$ gr.
Epinephrine.	See Adrenaline.		
Eserine.	See Physostigmine.		
Ferrum	Iron ore	Liquor ferri acetatis	5-15 minims
		Liquor ferri et ammonii acetatis	4 drachms
		Pilula ferri carbonatis (Blaud's pill)	5-30 gr.
		Syrupus ferri phosphatis co. (Parish's food)	$\frac{1}{2}$ -2 drachms
		Syrupus ferri phosphatis c. quinina et strychnina (Easton's syrup)	30-60 minims
		Liquor ferri perchloridi	—
Hydrargyrum (mercury)	—	Hydrargyri subchloridum	1-3 gr.
		Mercurous chloride (calomel)	
		Calomel powder	—
		Calomel powder	—
		Unguentum hydrargyri subchloridi	—

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
—	—	—
—	—	—
Relaxes bronchial spasm; raises blood pressure by contract- ing bloodvessels. Given in asthma and in spinal anæsthesia	Headache, giddiness, nausea, sweating, thirst	—
Emmenagogue. Given in œmia	Headache, loss of ap- petite, nausea, vo- miting, constipation	—
General tonic	—	—
—	—	—
—	—	—
—	—	—
—	—	—
Haemostatic. Used for con- trol of bleeding of superficial wounds	—	—
Emmenagogue. Intestinal antiseptic	Gastro enteritis, vom- iting, collapse —	Albumen water. Emetic or stomach lavage. Stimulants, as brandy, sal vola- tile. Demulcents. Intravenous saline. Sodium thiosulphate intravenously.
Antiseptic. Sores in syphilis	—	—
Antiseptic. Trachoma	—	—
Antiseptic. Syphilitic sores	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Hydrargyrum (continued)		Lotio hydrargyri nigra (black mercurial lotion)	—
		Unguentum hydrargyri ammoniatum (white precipitate ointment)	—
		Oculentum hydrargyri oxidi (yellow mercuric oxide)	1%
		Liquor hydrargyri perchloridi (mercuric chloride)	1-10,000 solution
		Biniiodide of mercury in spirit	1-500 solution
		Hydrarg. oxycyanidum	1-5,000 solution, 1-10,000 solution
		Unguentum hydrargyri	1 drachm
		Unguentum hydrargyri compositum (Scott's dressing)	—
		Mersalylum, "Salyrgan," "Novurit"	—
		Hydrargyrum cum creta (grey powder)	1-5 gr.
Hyoscine.	<i>See</i> Hyoscyamus.		
Hyoscyamus	Henbane leaves	Extractum hyoscyami siccum	$\frac{1}{4}$ -1 gr.
	Active principles: Hyoscyamine, hyoscine or scopolamine	Pil. colocynth. et hyoscyami	4-8 gr.

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
Antiseptic. Syphilitic sores	—	—
Antiseptic. Skin con- ditions	—	—
Antiseptic. Eye con- dition	—	—
Antiseptic. Irrigation wounds; vaginal ouches; irrigation eyes	—	—
Antiseptic. Skin pre- paration	—	—
Antiseptic. Bladder wage; irrigation of es	—	—
Antiseptic and syph- ilic conditions speci-	—	—
Antiseptic counter- iritant. For sprains; or chronic arthritis; tuberculous peri- nitis	—	—
Diuretics used in cardiac dropsy	—	—
Given to babies with congenital syphilis	—	—
Emblems belladonna. Given to allay grip- ing pain	As for atropine	—
Scyamus acts as antidote to griping effect of colocynth	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Hyoscyamus (continued)		Tinctura hyoscyami Hyoscine hydrobromide	30-60 minim 2½-11½ gr.
Iodine	Obtained from the ashes of seaweed	Liquor iodi mitis (tincture of iodine) Liquor iodi fortis Liquor iodi aquosus (Lugol's iodine) Potassium iodide	2-5 % solution 10 % 5-30 minim 5-15 minim 5-30 gr
Ipecacuanha	Ipecacuanha root	Sodium iodide Tinctura ipecacuanhæ Pulv. ipecacuanhæ et opii (Dover's powder), contains 10% opium and 10% ipecacuanha Emetine hydrochloride	— 10-30 minim ½-1 fl. oz. 5-10 gr. ½-1 gr.
	Emetine, active principle of ipecacuanha	Emetine bismuth iodide Magnesium carbonate Magnesium oxide Liquor magnesii bicarbonatis (fluid magnesia)	1-3 gr. 10-60 gr. — 1-2 fl. oz.
Magnesium			

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
ative. To allay intestinal spasm	—	—
notic. Given in	—	—
irium tremens, in		
ental confusion, and		
paralysis agitans		
iseptic. Skin pre-	Metallic taste in	—
eration; vaginal	mouth	
uche		
nter-irritant. To	Profuse secretion	—
ieve inflammatory	from nose and eyes,	
nditions; ringworm;	diarrhœa, cyanosis,	
check vomiting and	collapse	
ccough	—	—
—	—	—
cific action. Given	—	Boiled starch as anti-
Graves' disease and		dote. Demulcents as
kinomycosis		milk. Emetic or
		lavage.
pectorant; reduces	—	—
ood pressure. Given		
conditions of bron-		
chial catarrh, high		
ood pressure, aneur-		
ism and syphilitic		
nditions	—	—
—		
pectorant. Bron-	Nausea, vomiting, in-	Charcoal in water.
chitis	creased secretions	Stimulants.
etic	—	—
	—	—
odyne; diaphoretic	—	—
tion enhanced by		
mbination with		
rphism. In pneu-		
monia		
cific. Amœbic	—	—
sentery		
	—	—
onic dysentery	—	—
	—	—
acid. Dyspepsia	—	—
	—	—
acid. Dyspepsia	—	—
acid. Dyspepsia	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Magnesium (continued)		Mistura magnesii hydroxidi (cream of magnesia)	1-4 drachm
		Magnesium sulphate (Epsom salts)	$\frac{1}{2}$ -4 drachm
		Mistura alba ("white mixture"), contains magnesium carbonate 10 gr., magnesium sulphate 60 gr. in 1 oz.	$\frac{1}{2}$ -1 fl. oz.
		Mistura sennæ composita ("black draught"), contains magnesium sulphate, compound liquid extract of liquorice, tinctura cardamom and aromatic spirit of ammonia	1-2 fl. oz.
		Magnesium sulphate	25% solution
			10% solution 25% solution
			25% solution
		Magnesium sulphate paste	—
Mercury.	<i>See Hydrargyrum.</i>		
Morphine.	<i>See Opium.</i>		
Nux vomica	Obtained from the dried seeds of <i>Strychnos nux vomica</i>	Extractum nucis vomicæ liquidum	1-3 minims

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
acid. Dyspepsia	—	—
ine purgative: cho-	—	—
gogue	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—
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—	—	—
—	—	—
—	—	—
—	—	—
ter stomachic	Tetanic convulsions, producing opistho- tonos, asphyxia	Stomach lavage with potassium perman- ganate; chloroform. Keep patient quiet. Sodium amytal in- travenously.

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Nux vomica (continued)	Active principle strychnine	Tinctura nucis vomicae Strychnine hydro- chloride	10-30 minims $\frac{1}{32}$ gr.
		Liquor strychninae hydrochloridi	3-12 minims
		Syrupus ferri phosphatis c. quininae et strych- nina (contains $\frac{1}{80}$ gr. strychnine)	—
Opium	Juice obtained from capsule of <i>Papaver som- niferum</i>	Pulvis opii com- positus (Dover's powder) pulv. ipecac. et opii, contains 10% opi- um	5-15 gr.
		Tinctura opii (laudanum)	5-30 minims
		30 minims contain $\frac{1}{2}$ gr. morphine	—
		Tinctura opii cam- phorata ("pare- goric")	$\frac{1}{2}$ -1 drachm
		"Omnopon "	$\frac{1}{2}$ gr.
			$\frac{1}{2}$ gr.
		Morphine hydro- chloride	$\frac{1}{8}$ - $\frac{1}{2}$ gr.
		Liquor morphinae hydrochloridi (30 minims contain $\frac{1}{4}$ gr. morphine)	5-30 minims
		Suppositorum mor- phinae	—
		Diamorphinae hy- drochloridum (heroin)	$\frac{1}{2}$ gr.
		Linctus diamorphi- nae	$\frac{1}{2}$ -2 drachms

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
onic	—	—
Cardiac and respiratory stimulant. Given in respiratory failure in anæsthesia	—	—
—	—	—
onic	—	—
arcotic; diaphoretic	Vomiting. Sleep, stu- por and coma. Re- spirations slow and shallow. Pin-point pupils. Cyanosis. Pulse weak and slow	Stomach lavage, po- tassium permangan- ate, 60 gr. in 2 gal- lons. Warmth. Rous- ing treatment. Cof- fee per rectum. Atro- pine, strychnine. Ar- tificial respiration.
anodyne narcotic	—	—
to relieve diarrhœa	—	—
edative; expectorant	—	—
arcotic. Used for pre- medication before anæsthesia	—	—
—	—	—
arcotic and anodyne to relieve pain	—	—
arcotic and anodyne. Sometimes given to check hiccough	—	—
iven to relieve pain n hæmorrhoids	—	—
edative and anodyne. Given to relieve cough n phthisis and bron- chitis	—	—
—	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Opium (continued)	Oxidation product of alcohol	Codeinæ phosphas	$\frac{1}{4}$ -1 gr.
		Linctus codeinæ (proprietary preparation "Dilaudid")	$\frac{1}{4}$ -1 drachm
Paraldehyde		Paraldehydum	30-120 minims 2-4 drachms 1 drachm per stone of body weight in normal saline
Penicillin. See Chapter IX	Obtained from Calabar bean		
Physostigmine salicylate (eserine)		Lamellæ physostigminæ	$\frac{1}{1000}$ gr.
		Guttæ physostigminæ	1%
		Oculentum physostigminæ	0.125%
		Physostigmine salicylate	$\frac{1}{100}$ - $\frac{1}{2}$ gr.
Phenol (carbolic acid)	Coal-tar product	Lotio phenolis, carbolic lotion	3% solution
		Phenol liquefactum (pure)	—
		Glycerinum phenolis*	—

* This application must not be

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
<p>ypnotic. Depresses cough centre and given to relieve cough</p> <p>—</p>	<p>—</p> <p>—</p>	<p>—</p> <p>—</p>
<p>ypnotic. Used in cardiac and respiratory diseases</p> <p>asal anæsthetic</p>	<p>Vomiting and stupor. Cyanosis. Shallow respiration</p> <p>—</p>	<p>Emetic or stomach lavage. Ammonia inhalations. Coffee per rectum. Strychnine $\frac{1}{4}$ gr.</p> <p>—</p>
<p>ypnotic; decreases tension. Used in glaucoma, keratitis and to counteract the effect of atropine</p> <p>—</p> <p>—</p>	<p>Abdominal cramp. Nausea and vomiting. Diarrhœa. Excessive salivation and perspiration. Slow breathing. Slow pulse. Collapse</p> <p>—</p> <p>—</p> <p>—</p>	<p>Emetic or stomach lavage, potassium permanganate. Atropine sulphate $\frac{1}{10}$ gr. Stimulants, as strychnine, brandy.</p> <p>—</p> <p>—</p> <p>—</p>
<p>Improves tone of involuntary muscle. Given in paralytic leus</p> <p>Antiseptic. Used for irrigation of wounds</p>	<p>Nausea and vomiting. Green urine. Thin thready pulse. Faintness, collapse and coma</p> <p>—</p>	<p>Stomach lavage of magnesium sulphate. Demulcents. White of egg. Fats. Glycerine. Warmth. Artificial respiration. Strychnine.</p> <p>—</p> <p>—</p>
<p>Used for cauterising</p> <p>Used for painting throats in tonsillitis</p>	<p>—</p> <p>—</p>	<p>—</p> <p>—</p>

h water, as it becomes caustic in effect.

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Phenol (carbolic acid) (continued)		Guttæ glycerini phenolis (phenol)	5%
		Phenol in almond oil	5%
Pilocarpine	Obtained from leaves of <i>Pilocarpus jaborandi</i>	Pilocarpinæ nitras	$\frac{1}{20}$ - $\frac{1}{8}$ gr.
		Guttæ pilocarpinæ	0.5% solution
Pituitary extract	Posterior lobe of pituitary gland	Pitocin	$\frac{1}{2}$ -1 c.c.
		Pitressin	$\frac{1}{2}$ -1 c.c.
Potassium		Potassium acetate, potassium bicarbonate, potassium carbonate, potassium citrate	15-60 gr.
		Potassium chlorate	5-10 gr.
		Tabellæ potassii chloratis	5 gr.
Quinine. See Cinchona.			
Scilla (squill)	Obtained from scilla bulb	Tinctura scillæ (vinegar of squill)	5-30 minims

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
aural purposes	—	—
treatment of hæmorrhoids	—	—
phoretic. Given in al dropsy	Slow weak pulse. Profuse secretion of saliva and perspiration. Nausea and vomiting. Abdominal pain. Dizziness. Delirium. Rapid difficult breathing due to collection of mucus	Emetic or stomach lavage, potassium permanganate, 10 gr. in 1 pint. Atropine sulphate. Stimulants, as brandy.
tracts pupil and eases intraocular tension. Used in is and glaucoma, less irritating than atropine	—	—
stimulates uterine contraction in labour	—	—
tracts plain muscle of arteries and intestines; raises blood pressure. Given in partial paresis of intestine, surgical shock, and in treatment of morphin coma	—	—
ne diuretics and render urine alkaline. Given in treatment of <i>coli</i> infection	Abdominal pain. Suppression of urine. Cyanosis, coma and collapse	Stomach lavage. Emetic. Soda bicarbonate freely. Warmth. Stimulants.
septic. Given in matitis and tonsillitis	—	—
above	—	—
resembles action of digitalis; has diuretic action in cardiac dropsy. Given as an expectorant	As for digitalis poisoning	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used</i>	<i>Dose.</i>	
Scilla (squill) (continued)	Active principle scillaren	Syrupus scillæ	30-60 minims	
Senna	From dried leaves of <i>Cas- sia senna</i>	Confection of senna	0-120 gr.	
		Pulv. glycerrhizæ co.	60-120 gr.	
		Senna pod	—	
		Syrupus sennæ	30-120 minims	
		Mistura sennæ com- posita ("black draught"), con- tains magnesium sulphate, liquorice, cardamom and spirit of ammonia	1-2 fl. oz.	
Sodium	—	Sodium chloride	10-60 gr.	
		Liquor sodii chlori- di (normal saline)	0.9% solution	
		Hypertonic saline solution (sodium chloride 5% in distilled water)	—	
		Sodium bicarbon- ate	15-60 gr. —	
		Mist. sodii bicar- bonatis aromati- ca (mistura car- minativa), con- tains sod. bicar- bonate with aro- matic sp. of am- monia, tinct. car- damom, glycerine and dill water	$\frac{1}{2}$ -1 fl. oz.	

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
—	—	—
ergative	—	—
—	—	—
—	—	—
—	—	—
—	—	—
emetic; saline enema or nutriment and stimulant purposes; anthelmintic. Given in Addison's disease to combat surgical shock for treatment of wounds	—	—
Given in vomiting	—	—
to counteract action of corrosive acid or dyspepsia	—	—
—	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>	<i>4</i>
Sodium (continued)		Sodii tartras, sodii et potassii tartras, sodii phosphas, sodii sulphas Sodium citrate	— 30 G. 1-3 gr. 0.2%	is
		Acid sodium phos- phate	30-60 gr.	to
Streptomy- cin	See Chap. IX			n
Strychnine.	See Nux vomica.			
Sulphon- amides	Organic chemi- cal substances			
		Sulphanilamide	0.10 G. per kg. of body weight daily in 4-hourly doses not ex- ceeding 10 G.	L in de

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
e purgatives	—	—
n in treatment of losis to prevent nation of large s. Prevents co- lation	—	—
ary antiseptic by easing the acidity rine	—	—
ve bacteriostatic ts used as anti- ics in blood and y tissues and s	Some of the sulphon- amides are less toxic than others. The main symp- toms are: Cyanosis, vomiting, nausea and headache; drug fever accom- panied by rash; hæmaturia pro- duced by crystals of a compound of sul- phonamide which form in the urinary tract and irritate and damage the mucosa; anuria; agranulocytosis which is of severe significance	The toxic symptoms may be prevented by the administration of fluids, 6 pints per day, during the course of intensive treatment. Alkalis are given with the drugs. Aperients producing a watery stool should be avoided. In very serious cases of re- action the drug should be stopped and copious fluids should be given. If anæmia is present blood transfusion may be given.
eptococci; phylococci; nococci	—	—
wounds and rns	—	—

<i>Drug.</i>	<i>Derivative.</i>	<i>Preparations Used.</i>	<i>Dose.</i>
Sulphon-amides (continued)		Sulphadiazine	1 G. 4-hourly
		Sulphamerazine	1 G. 8-hourly
			1.5 G. 2-hourly
		Sulphapyridine	1 G. 4-hourly
		Sulphathiazole	1.5 G.
		Sulphaguanidine	1 G. 12 G. daily
		Succinyl sulphathiazole	
Turpentine	Obtained from sap of pine tree	Phthalylsulphathiazole	10 G.
		Sulphacetamide	5 to 30 per cent. solution
	Terebintha	Oil of turpentine	3-10 minims
		Oil of turpentine	—
			1-2 drachms 1 oz.-1 pint soap solution

<i>Action and Uses.</i>	<i>Poisoning Symptoms.</i>	<i>Treatment.</i>
neumococcal; streptococcal; monococcal neumococcal infec- tions; hæmolytic streptococcal infec- tions; meningococcal meningitis	—	—
neumococci; streptococcal streptococcal; Staphylococcal; Pneumococcal bowel infections; Ba- cillary dysentery; ulcerative colitis	— — —	— — —
Eye infections	—	—
Antiseptic diuretic in cystitis	Vomiting, nausea, diarrhœa	Emetic, stomach lav- age. Magnesium sul- phate. Morphia to relieve pain. De- mulcents.
Analgesic; rubefacient; styptic	—	—
To relieve abdominal distension	—	—
Antispasmodic to re- lieve flatulence after operation	—	—

APPENDIX V

TYPICAL EXAMINATION QUESTIONS*

(1) What are a nurse's duties in connection with administration of medicines? What action should a nurse take in the event of a wrong medicine having been taken?

(2) What instructions would you give to a practitioner with regard to the following:

- (a) The safe keeping of poisons;
- (b) The administration of medicines by mouth;
- (c) The giving of hypodermic injections?

(3) Name any six drugs commonly administered by hypodermic injection and state the purposes for which they are used. How would you administer a hypodermic injection?

(4) What drugs are commonly administered by hypodermic injection, and what are their effects upon the patient? What precautions should a nurse observe in giving such injections?

(5) What precautions should a nurse take when giving a hypodermic injection?

(6) Mention the precautions which should be taken in giving a drug by hypodermic injection.

(7) A patient is ordered a dose of $\frac{1}{4}$ gr. of morphine hypodermically. You have a 2 per cent. solution of morphine. How much will you inject?

(8) Give a list of the symptoms and signs of morphine poisoning.

(9) Write out in full the apothecaries' weight and the fluid measure, giving the symbols used. What is the approximate quantity in English weight and measures of:

* Taken from recent examination papers by permission of the General Nursing Council for England and Wales.

- (a) 1 cubic centimetre;
- (b) 1 gramme;
- (c) 1 litre ?

(10) Give a list of the substances which may be administered by intravenous injection. How would you make up and prepare 1 pint of a 5 per cent. solution of glucose for intravenous injection ?

(11) In what cardiac conditions is digitalis most commonly used ? What signs indicate that the drug is acting satisfactorily ? What are the signs and symptoms of an overdose ?

(12) What are the signs and symptoms of poisoning by digitalis ?

(13) What symptoms suggest that the following medicines are not suiting the patients :

- (a) Digitalis;
- (b) Iron;
- (c) Strychnine;
- (d) Calomel;
- (e) Quinine ?

(14) What do you know about :

- (a) Carbohydrate;
- (b) Carbolic acid;
- (c) Pituitrin;
- (d) Protein;
- (e) Mercury perchloride ?

(15) State briefly the signs and symptoms which result from a large dose of :

- (a) Atropine;
- (b) Morphine;
- (c) Sodium salicylate.

(16) State the way in which each of the following substances is used, and mention one or two diseases in which it is of special value :

- (a) Amyl nitrite;
- (b) Camphor;
- (c) Hexamine (urotropine);
- (d) Vitamin C;
- (e) Acriflavine;
- (f) Lipiodol.

(17) State briefly what you know of the use and method of administration of:

- (a) Amyl nitrite;
- (b) Diuretics;
- (c) Paraldehyde;
- (d) Vitamin C;
- (e) Aspirin.

(18) What is the action of each of the following substances? In what way and in what conditions may each of them be used?

- (a) Sulphur;
- (b) Turpentine;
- (c) Digitalis;
- (d) Phenolphthalein;
- (e) Homatropine.

(19) What symptoms of intolerance may be shown by a patient during the administration of the following drugs:

- (a) Belladonna;
- (b) Insulin;
- (c) Salicylate of soda;
- (d) Arsenic;
- (e) Mercury?

(20) Enumerate the different ways in which drugs may be administered.

Give examples and state the uses of the following:

- (a) Diaphoretics;
- (b) Emetics;
- (c) Narcotics.

(21) For what purposes and in what ways may the following substances be used in medicine:

- (a) Sassafras;
- (b) Luminal;
- (c) Hydrochloric acid;
- (d) Vitamin D;
- (e) Liver extract ?

(22) What is the usual dose for an adult of:

- (a) Chloral hydrate;
- (b) Luminal;
- (c) Strychnine;
- (d) Morphia;
- (e) Strophanthin ?

Enumerate the conditions for which each of these drugs is given.

(23) For what reasons are the following drugs used in surgery ? Give the dosage and indicate the method of administration. (Five only to be answered.)

- (a) Atropine;
- (b) Avertin;
- (c) Coramine;
- (d) Hyoscine or scopolamine;
- (e) Iodine;
- (f) Paraldehyde.

(24) What are the symptoms of an overdose of:

- (a) Thyroid gland tablets;
- (b) Digitalis;
- (c) Strychnine;
- (d) Morphine ?

(25) Give the various uses in nursing of the following:

- (a) Glucose;
- (b) Turpentine;
- (c) Iodine;
- (d) Glycerine;
- (e) Methylated spirit.

(26) Name five antiseptic solutions. State for what purposes each may be used and in what strength.

(27) What is the difference between a serum and a vaccine? Give illustrations of each, and state what complications might arise as the result of an injection of serum.

(28) Give the symptoms of poisoning by (a) coal gas, (b) hydrochloric acid, (c) morphia, and the appropriate first-aid treatment in each case if a doctor is not immediately available.

(29) For what purposes are the following used, and how are they administered:

- (a) Insulin;
- (b) Antiphlogistine or kaolin poultice;
- (c) Dover's powder;
- (d) Oxbile?

(30) For what medical and nursing purposes may the following be employed:

- (a) Hypertonic saline;
- (b) Barium sulphate;
- (c) Turpentine?

State briefly how you would prepare and administer any one of these.

(31) For what conditions may the following drugs be used? How and in what dosage are they given?

- (a) Paraldehyde.
- (b) Ephedrine.
- (c) Amyl nitrite.
- (d) Hyoscine.
- (e) Hexamine (urotropine).

(32) State the action, average dose and method of administration of the following:

- (a) Pilocarpine.
- (b) Omnopon.

- (c) Quinine sulphate.
- (d) Belladonna.
- (e) Sodium salicylate.

(33) How would you prepare 1 pint of each of the following:

- (a) Normal saline;
- (b) Acriflavine 1-8,000 from a solution of 1-1,000;
- (c) Hydrogen peroxide 2.5 volumes from a 10-volume stock supply?

(34) State the action, average dose and method of administration of the following drugs:

- (a) Paraldehyde.
- (b) Adrenaline.
- (c) Digitalis.
- (d) Amyl nitrite.
- (e) Atropine.

(35) What observations should be made on a patient who is having the following drugs:

- (a) a Sulphonamide.
- (b) Digitalis.
- (c) Insulin?

(36) What symptoms may arise as a result of over-dosage of the following drugs:

- (a) Insulin.
- (b) Digitalis.
- (c) Sodium salicylate.
- (d) Atropine?

(37) What symptoms may occur with over-dosage of the following drugs

- (a) Digitalis.
- (b) Insulin.
- (c) Phenobarbitone (luminal)?

Give a brief account of the treatment of a case of barbiturate poisoning.

(38) Name the drugs which are controlled by the Dangerous Drugs Act. What rules regarding the custody and administration of these drugs must be observed by the nursing staff in a hospital? How would you prepare a hypodermic injection of morphine, $\frac{1}{6}$ grain, from a tablet containing $\frac{1}{4}$ grain?

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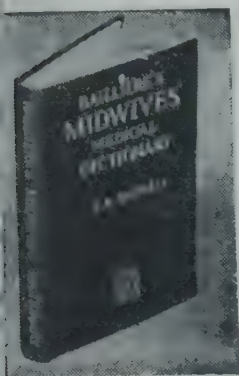
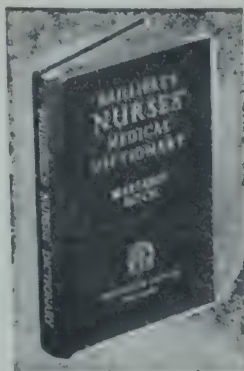
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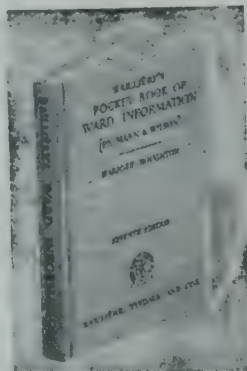
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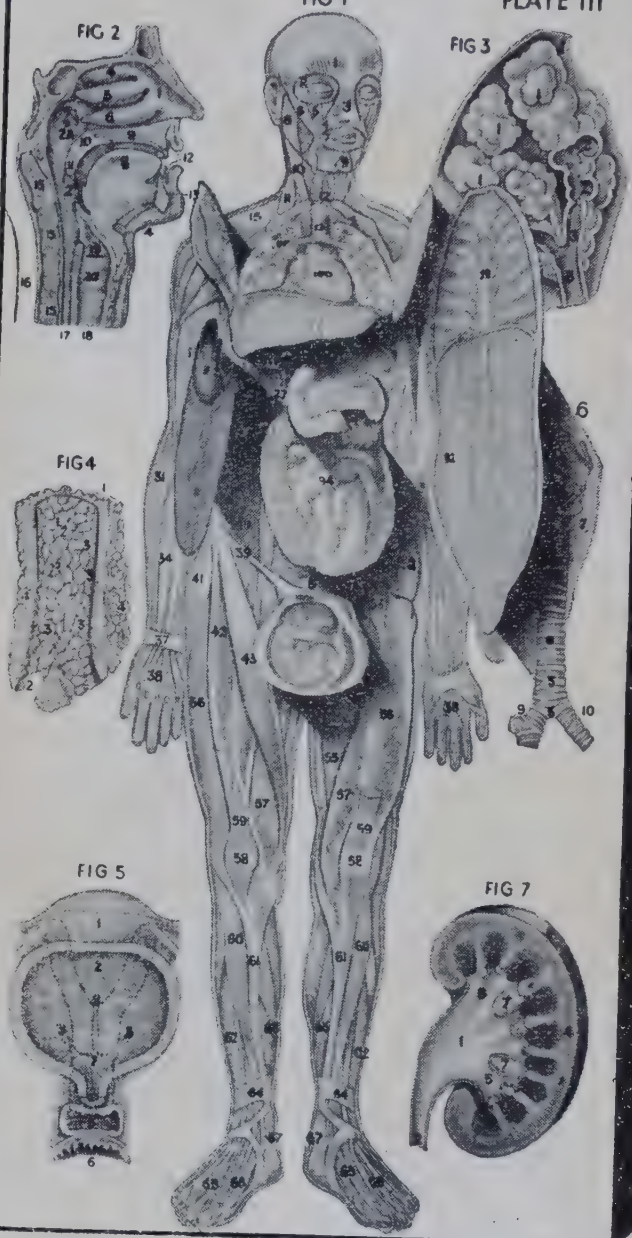
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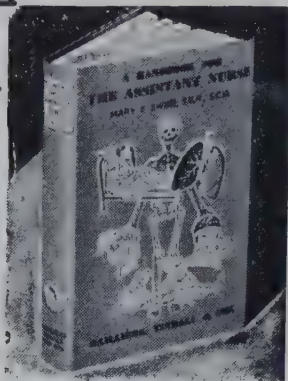
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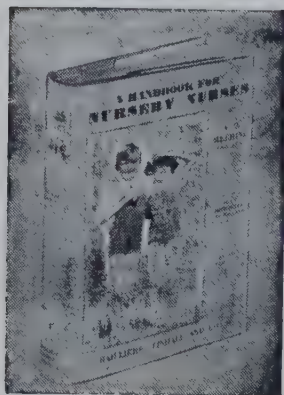


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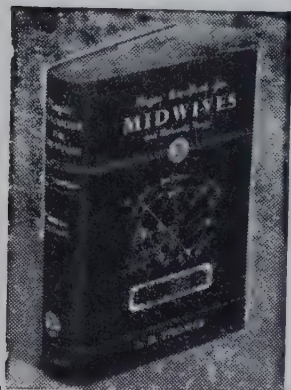


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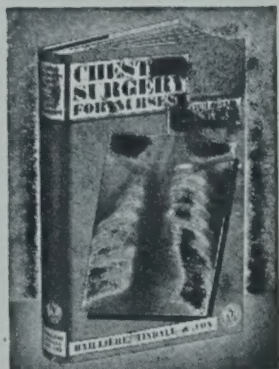


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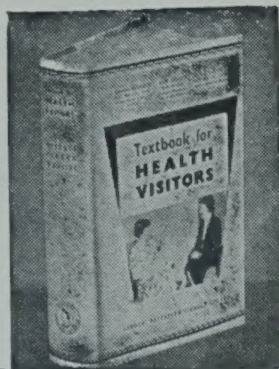


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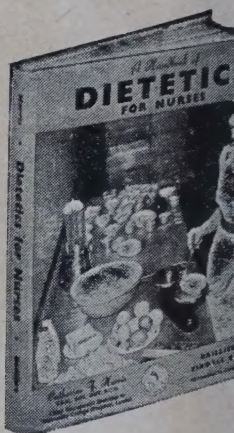
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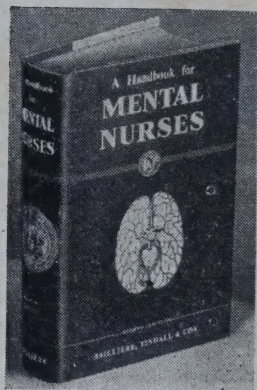


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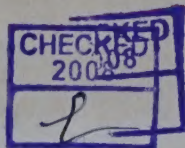
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